

ASSESSMENT OF A LIBRARY LEARNING THEORY BY MEASURING LIBRARY
SKILLS OF STUDENTS COMPLETING AN ONLINE
LIBRARY INSTRUCTION TUTORIAL

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This study is designed to reveal whether students acquire the domains and levels of library skills discussed in a learning library skills theory after participating in an online library instruction tutorial. The acquisition of the library skills is demonstrated through a review of the scores on online tutorial quizzes, responses to a library skills questionnaire, and bibliographies of course research papers. Additional areas to be studied are the characteristics of the participants enrolled in traditional and online courses at a community college and the possible influence of these characteristics on the demonstrated learning of library skills.

Multiple measurement methods, identified through assessment of library instruction literature, are used to verify the effectiveness of the library skills theory and to strengthen the validity and reliability of the study results.

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CHAPTER 1

INTRODUCTION

Introduction of the Problem

The seeking, use, and evaluation of information is an activity engaged in by most people as a daily event. How do individuals, as information seekers, learn the process required to accomplish the multiple steps and processes required to be successful in information-related tasks? The steps and processes are learned through both formal and informal instruction and through repeated learning experiences that developed into information literacy competencies. The theory of *library learning behaviors* introduced and discussed in the literature over time by Nahl-Jakobovits and Jakobovits, demonstrates the process beginning with knowing that there is an information need, to seeking information in various resources, and on to using information acquired (Jakobovits and Nahl-Jakobovits, 1987, Nahl-Jakobovits and Jakobovits, 1990, 1992, and 1993).

The theory is still vital today and is inclusive of the electronic nature of learning library skills behaviors. Library learning behaviors, and the instructions and education required to acquire the behaviors, are all included in the concept of *information literacy competency*. How library instruction is delivered and how the effectiveness of the instruction is measured are both critical for today's students. Information literacy has a profound impact on education, employment, and quality of life in today's information-driven and information-rich environment.

Learning Information Literacy Skills

The American Library Association (ALA), through its Association of College and Research Libraries (ACRL) division, promotes both the need to acquire information literacy competencies and the need to teach information literacy through its conferences, publications, and Web sites. The ALA is also instructing its constituency on the need to encourage incorporation of information literacy and its associated concepts and theories into the general curriculum of education in order to better prepare students for a lifetime of information seeking and information use (ACRL, 2000a; ACRL, 2002; Branch and Dusenbury, 1993; Dusenbury, Fusich, Kenny, etc., 1991).

Information literacy, as defined by the ACRL (2002, ¶ 1) in the document *Information Literacy Competency Standards for Higher Education*, “is a set of abilities requiring individuals to ‘recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information’.” The term encompasses all previous early definitions of library instruction through to the more recently used term *bibliographic instruction* and in addition expresses an individual’s need to understand all of the elements noted in the definition.

Bibliographic instruction and library instruction are used interchangeably in the literature but generally refer to the instruction associated with learning how to use library resources. For this study, the researcher uses the term *library instruction* to note the formal instruction students receive during their completion of higher education coursework.

The information literacy competencies are a demonstration of skills and are defined and clarified by objectives and goals. The Association of College and Research

Libraries (ACRL) division of the ALA defined, published, and promoted the competencies as adopted in 2001. The foundation of the instruction required to prepare students to be information literate includes the following characteristics: recognizing that an information need exists, forming a query, identifying resources, acquiring the information needed, and evaluating the information retrieved (ACRL, 2001a, ACRL, 2001b; National Information Literacy Institute, 2001).

Although the information literacy competencies are commonly thought of as those that should be included in general curricula, they must also be acknowledged as a necessary component of higher education. Thus, students enrolled in distance learning course offerings, regardless of delivery mode, must be considered as well as those receiving instruction in a traditional classroom (ACRL, 2002; Pausch and Popp, 1997). The ACRL (2002, ¶ 4) defines distance learning library services as “those library services in support of college, university, or other post-secondary courses and programs offered away from a main campus, ... These courses may be taught in traditional or non-traditional formats or media, may or may not require physical facilities, and may or may not involve live interaction of teachers and students. The phrase is inclusive of courses in all post-secondary programs designated as ... virtual, synchronous, or asynchronous.”

Electronic technology is integrated in both traditional on-campus environments and in the distance learning environment. Therefore, teaching competent use of information resources in a variety of media such as print, CD-ROM, or electronic must be included in a library instruction programs. Instruction must include not only what type of content may be found in information resources but also the strategies required for

successful retrieval of that content. The computer literacy required to effectively navigate within the resources must also be considered. A multitude of publications discuss the methods of accomplishing information literacy education (Barclay, 1995; Evans, 2000; LaGuardia, Blake, Farwell, etc, 1996).

To assess and document that the learning of these competency skills is being accomplished, measurable demonstrated outcomes should be included as a required component of any library instruction program regardless of the instructional delivery mode: traditional classroom, CD-ROM, or online tutorial. Overall effectiveness of the instructional program must also be evaluated in order to establish whether the students are utilizing the information literacy competencies being taught.

A very visible expression of the necessity of information competency instruction and its assessment is demonstrated by the trend of college and university regional accrediting agencies to include this instruction and the documentation of results in their respective accrediting standards. This trend is prevalent in the current professional literature. The effect that all of this current attention has on academic institutions' missions, allocation of resources, and future directions and goals is reflected in the revisions both adopted and under review by the regional accreditation commissions (Gratch-Lindauer, 2002; Hardesty, 2000; Ratteray, 2002; G. Thompson, 2002).

Abundant literature on information literacy and library instruction in today's academic society reflects a wide variety of potential research interests. The literature along with American Library Association's publications and the regional accrediting agencies published standards, coupled with the dramatic increase of higher education distance learning students, indicates the need for research focusing on methods of

assessing the success of information literacy instruction. The prolific expansion of distance learning elevates the importance of the assessment documentation and evaluation of the effectiveness of the instruction for this growing segment of students.

Influences of Online Instruction

In the academic library community of colleges and universities, the need to develop information literate graduates is a top priority. The proliferation of distance learning course offerings along with the accessibility of online instruction and electronic information resources provides a driving force for a study exploring the effectiveness of online technology-based library instruction programs offered under the banner of information literacy (Zhang, 2002). Documenting the information literacy competencies through students' demonstrated outcomes and coordinating the assessment results with regional accreditation standards is a primary objective for academic libraries.

Studying Library Instruction Effectiveness

The taxonomy of library learning was introduced into the literature by Jakobovits and Nahl-Jakobovits (1987). Subsequent revisions of the taxonomy, along with additional studies and abundant publications from these two authors, provide the library profession with a practical theory that can be utilized to review and measure library instruction programs (Nahl-Jakobovits and Jakobovits, 1990, 1992, and 1993). There is a need to determine whether the instruction is altering the students' information seeking and use behaviors for their academic endeavors. Relating the outcomes noted in the taxonomy to those published by the ALA will assist in establishing a framework of an effectiveness study.

Incorporating a means of determining effectiveness into an online library

instruction program is highly desirable. The methods for achieving a determination of effectiveness present challenges. There are methods for learning assessment in the literature, but most describe the learning environment of traditional instruction. Thus, a study for assessing effectiveness of library instruction delivered through an online environment, utilizing established assessment methods altered for online learning, increases the body of knowledge related to the assessment of students' acquisition of information literacy competencies learned through online instruction and promotes information literacy instruction goals.

Background

Information literacy is not a new concept. Bibliographic instruction is the terminology traditionally used to denote teaching the skills required for utilizing the library and its resources. References to instruction connected with the Great Library of Alexandria (Lorenzen, 2001) and more current library instruction history are reported in the professional literature. In recent years the term *bibliographic instruction* has undergone alteration and now the concepts associated with bibliographic instruction are commonly referred to as *information literacy*. This term encompasses not only the instruction provided but also includes the demonstration of competencies acquired by the students as a result of the instruction. Transforming the general concept of a four-walled building of books to the concept of a resource that promotes the learning of life-long information acquisition competencies is imperative (Stoffle & Williams, 1995).

The Regional Institutional Accrediting Agencies, as listed on the U. S. Department of Education Web site (U. S. Department of Education, 2005), provide direction and related documentation denoting the expectations and guidelines for

information literacy and for online education. Each agency disseminates this information through its Web sites and publications.

The information literacy objectives referred to in this document are those published by the Association of College and Research Libraries (ACRL) division of the American Library Association as adopted in 2001 (ACRL, 2001a). Information literacy has many overseers: accrediting bodies, professional associations, and especially librarians seeking to ensure that programs are effective.

Online Learning

Learning theory research influenced the online instruction environment. Online instruction designed to educate, not just to provide information, is an issue discussed in many publications. The current research devoted to verifying learning can occur through online instruction should be reviewed, assimilated, and incorporated to affect purposeful instruction; otherwise, the teaching will not result in learning (Abbey, 2000; Barclay, 1995).

Library instruction programs are available in both traditional and electronic format to students, instructors, and librarians. Online instruction is a popular format for reaching the large number of distance students enrolled in academic courses. There are many positive aspects to this mode of instruction delivery: namely, availability 24 hours a day, accessibility to all who wish to avail themselves of the instruction, and ease of incorporation into curricula. Emphasis on accountability is vital, with outcome assessment measures required to ensure learning effectiveness.

Information Literacy Standards

Information literacy is under review in terms of how the mission of an institution

guides the institution to produce information literate graduates. United States regional accreditation commissions are revising their expectations for higher education institutions to reflect the important influence that information literacy has in all aspects of the education experience. A motivation for the accreditation commissions is “Title IV of the 1998 Higher Education Amendment requir[ing] universities receiving federal monies to have an outcomes assessment plan that includes a review of the institution’s success with respect to student achievement (Gratch-Lindauer, 2002, ¶ 2).”

Another important source of standards is the ACRL’s documentation of information literacy standards and the competencies related to those standards. The adoption of the standards in 2001 provided academic libraries with a set of guidelines for information literacy instruction along with learning objectives and measurable outcomes standards (ACRL, 2000b).

Assessment Methods

Assessment studies of library instruction and library resource use skills are in the professional literature. However, to date, most are limited to traditional face-to-face instruction. The literature relating to assessment of online library instruction studies the tool itself and not the measurement of learning outcomes. The methods for assessing the library skills of students who receive instruction from an online program must be developed, validated, and studied to determine effectiveness in demonstrating the students’ acquired competencies.

Statement of the Problem

Online delivery of library instruction is currently available. This method of instruction is being promoted and used by colleges and universities. College students

and graduates are required to be information literate and able to function in an information-rich environment. Articles such as Creth's discussion of information as a "primary economic commodity" (Creth, 1996, ¶ 3) and Oman's *Information Literacy in the Workplace* (2001) highlight the corporate view that information literacy is necessary and should be pursued throughout a person's employment career. Studies to determine the effectiveness of online library instruction in providing a learning environment conducive to acquiring the information literacy competencies are not currently in the literature. Studies are needed to document the effectiveness of online instructional programs and also to provide colleges and universities the accountability documentation required by accrediting commissions, employers, and all life-long learners.

This study examines whether an online library instruction program is effective in its ability to influence a student's library and information resource use behavior and how this influence is documented.

Purpose of the Study

The purpose of this study is to determine whether an online library instruction program provides the instruction necessary to change the level of library skills of students as demonstrated through the taxonomy of library skills published by Jakobovits and Nahl-Jakobovits. The study updates and validates the taxonomy not previously tested in the online environment (D. Nahl, personal communication, November 5, 2006). The study examines measurement methods designed to demonstrate library skills competency improvement as a result of participation in an online library instruction program. Specifically, measuring improvement in library skills competencies and level of library learning behaviors attributed to an online tutorial program completed by students

enrolled in an undergraduate core curriculum course delivered both in a traditional classroom and in an online environment. The measurement methods would support documentation of the effectiveness of the program in demonstrating that learning of information literacy competencies occurs.

Research Questions and Hypotheses

Students entering higher education have varied experience and skill levels in information seeking, use, and evaluation. A current trend for academic libraries is to provide a general library instruction program through an online format created either by the library's own staff or provided by an outside source in an attempt to reach and provide instruction to as many students as possible. The students participating in this delivery format should demonstrate measurable information literacy competencies after completing library instruction as evidenced by methods such as evaluation of course-required research paper bibliographies. The assessment methods used for this study are derived from the professional literature and altered for the online learning environment. The competencies are assessed through a questionnaire about library skills and through a comparison of bibliographies created before and after the library instruction.

Effectiveness of the online library instruction is demonstrated through a review of scores from the responses to the library skills questionnaire and scores derived from students' course work bibliographies. The finding is supported by a further review of the measurements comparing students enrolled in a traditional delivery course to those enrolled in an online delivery course.

There are two demographic characteristics that are reviewed for this study. The

literature review discusses several studies using reviews of bibliographies from students who had and who had not received formal library instruction, who were first-year students and who were completing their degree requirements, and who generally were studying in the same discipline. A first-semester student taking online courses may not have had an opportunity to participate in formal face-to-face library instruction. A comparison of the first-semester students' performance on the measurement tools in relation to a returning students' performance is reflective of the discussion presented in previous studies (Roselle, 1997; Kohl & Wilson).

The second demographic characteristic is one presented by the population enrolled in the community college participating in this study. The community college enrolls a large number of active military students stationed in Texas and world-wide. A comparison of the performance of the active military students in contrast to the civilian students is conducted in recognition of this high number of military students.

The research questions identified for this study include:

1. To what extent does the level of library research strategies increase for college students who participate in online library instruction, as demonstrated through a library research strategies questionnaire and measured using specific criteria for research paper bibliographies?
2. To what extent does course delivery mode, specifically traditional classroom or online modes, affect changes in information literacy behaviors and performance on online tutorial quizzes for students participating in online library instruction?
3. To what extent does the fact that participants are new versus returning students affect changes in their information literacy behaviors and performance on online

tutorial quizzes after participating in online library instruction?

4. To what extent does the fact that participants are active military versus civilian students affect changes in their information literacy behaviors and performance on online tutorial quizzes after participating in online library instruction?

For each of the research questions there are hypotheses to be tested. For Research Question 1 about library research strategies the hypotheses are:

1. The level of library research strategies, as measured by a library skills questionnaire, increases significantly in post-instruction results for all participants after completing online library instruction.
2. The scores for students' research paper bibliographies, as measured using specific criteria, increases significantly for all participants after completing online library instruction.

The hypotheses for Research Question 2 about the course delivery mode are:

3. The level of library research strategies differs significantly for students who participate in online library instruction while they are enrolled in traditional classroom versus online courses.
4. The scores for students' research paper bibliographies differ significantly for students who participate in online library instruction while they are enrolled in traditional classroom versus online courses.
5. The Texas Information Literacy Tutorial quiz scores differ significantly for students who participate in online library instruction while they are enrolled in traditional classroom versus online courses.

The hypotheses for Research Question 3 comparing new versus returning students are:

6. The level of library research strategies differs significantly for new versus returning students who participate in online library instruction.
7. The scores for students' research paper bibliographies differ significantly for new versus returning students who participate in online library instruction.
8. The Texas Information Literacy Tutorial quiz scores differ significantly for new versus returning students who participate in online library instruction.

The hypotheses for Research Question 4 about the active military versus civilian student are:

9. The level of library research strategies differs significantly for students who are active military versus civilian students who participate in online library instruction.
10. The scores for students' research paper bibliographies differ significantly for students who are active military versus civilian students who participate in online library instruction.
11. The Texas Information Literacy Tutorial quiz scores differ significantly for students who are active military versus civilian students who participate in online library instruction.

Significance of the Study

This study incorporates and extends the theory of Jakobovits and Nahl-Jakobovits (1987) on the library learning behaviors of students. The theory addresses three domains of learning: the affective, the cognitive, and the psychomotor. The initial theory, identified as the taxonomy of library skills and errors, has been discussed by the authors in many subsequent publications and was used to model studies on student library skill learning behaviors. A study conducted by the authors to demonstrate the

taxonomy consisted of a questionnaire for students to report their library experiences and behaviors (Jakobovits and Nahl-Jakobovits, 1990). Formal library instruction was not provided in this study.

Using the taxonomy to demonstrate a student's level of library strategy behavior after online library instruction increases the knowledge of the effectiveness of the instruction. *Effectiveness* may be defined as the achieving of the ACRL *Information Literacy Competency Standards for Higher Education* (2002) competencies and also defined as achieving the demonstrated behavior levels designated in the taxonomy of skills and errors published by Jakobovits and Nahl-Jakobovits (1987, p. 207).

This study builds on published methods for assessing information literacy competencies. It incorporates the Library Research Strategies Questionnaire developed and validated by Landrum and Muench (1994) to measure library research strategies. The assessment method published by Gratch (1985) relating the use of an outcomes measurement of student generated bibliography comparisons is the basis for measuring instructional effectiveness. These methods are currently accepted and employed for determining the effectiveness of library instruction for information literacy competencies.

Measuring effectiveness of library instruction is a vital concern for academic libraries. This study enables data based on library skills questionnaire scores and on measurable outcomes obtained from the bibliographies to be represented quantitatively for descriptive discussion and for the study to be considered valid. The data assists in determining whether an online library instructional program is providing the learning experience required to develop and utilize the information literacy competencies identified in the literature by accrediting agencies and by professional organizations.

Limitations of the Study

Previous library instruction studies published in the literature and dissertations are comparisons of two or more instructional presentation methods, and sometimes a control group not receiving instruction, with a resulting assessment of presentation effectiveness. The Gratch publication discussed a study designed to provide data on effectiveness of learning in a traditional learning environment (1985). The first level of the updated taxonomy requires students to acknowledge their need to learn library skills and discover that the library instruction is in electronic format. Thus, a control group was not incorporated into the study as those students would not have an opportunity to progress through the taxonomy's levels.

This study assesses the effectiveness of specifically an online instructional format for library instruction, as the interactivity, individuality, and accessibility of an online instructional presentation cannot be reproduced in a traditional face-to-face classroom session. Whereas the online tutorial allows the students to choose a topic among several to incorporate into the instruction, choose the order of the topics or modules to be learned, choose to access the instruction at a time and place convenient to the student, and have an interactive experience in contrast to the traditional linear lecture experience, these choices are not available to the student in a classroom of thirty all listening to the same single instructor.

A limitation of the study is a lack of generalizing the results to other academic settings due to the fact that the study is conducted at a two-year community college. The population demographics of this college may not be comparable to other community colleges nor to four-year institutions. The population participating in the

study included a significant proportion of active military due to the college's providing education on military facilities and through contracted military online instructional programs.

Another limitation is the inability to determine whether students' academic history and possible exposure to previous library instruction and level of information use affects the measuring of the online instructions' effectiveness. This issue is addressed in the demographics questionnaire but individual perceptions of what library instruction is may lead to self reporting concerns. The demographic questions specific to this issue are reviewed and discussed in an effort to minimize this limitation.

CHAPTER 2

LITERATURE REVIEW

Introduction to the Review

Assessment of learning is prevalent in the educational literature. For the purpose of this paper, assessment of learning specific to library instruction for information literacy competencies is the focus of the literature review. A review of the history of library instruction up to current library instruction standards is included along with a discussion of current online instruction availability. The review is concluded with a discussion of the need for and the ability to assess library instruction effectiveness as noted in the literature.

Assessment of Learning

Barclay, a noted author on the evaluation of library programs, stated that throughout the 20th century several publications have decried “the general lack of meaningful evaluation of library instruction programs (Barclay, 1993, p. 195).” That being said and echoed by many, evaluating the effectiveness of bibliographic instruction creates many opportunities for publication.

A review of library instruction evaluative data demonstrates that user satisfaction appears to be what is actually studied, not what users learned (Barclay, 1993). One reason presented for this lack of meaningful evaluation is the complexity of creating effective measurements and the amount of time required for administering, reviewing, and applying. The need for this evaluation is increasing through external pressures related to outcomes assessment

documentation. Solid data can be obtained regardless of such considerations as resources, size of the library, and number of library personnel.

Often cited in discussions on bibliographic instruction is Werking's collection of bibliographic educational evaluation tools (ALA, 1983). Bober, Poulin, and Vilen's (1995) monograph *Evaluating Library Instruction in Academic Libraries: A Critical Review of the Literature, 1980-1993*, highlights librarians' desire to provide quality instruction through publishing efforts designed to share knowledge on evaluation methods. More current collections of published works with emphasis on assessment issues can be located online in Web sites such as SUNYLA (State University of New York Librarians Association) Library Instruction Committee's (1998) *Annotated Selected Bibliography on the Evaluation of Library Instruction*. The online format allows this particular bibliography to be updated by the committee periodically, to the benefit of those reviewing current library instruction evaluation sources. Of note is that the majority of these publications review the assessment of traditional library instruction. Traditional library instruction refers to face-to-face classroom instruction.

History and Evolution of Library Instruction

Technology for the sharing and preservation of information possibly began with oral recitation, progressed to quills and paper, from printing presses to typewriters, evolving to stand-alone workstations and now to wired and wireless Internet-connected personal computers. The collection, organization, and storage of the information generated from those technologies have historically been the domain of the library.

Library instruction developed and evolved to assist those with an information need on how to extract, evaluate, and utilize the information contained in a library's holdings. This instruction, generally termed bibliographic instruction, developed and evolved throughout history in many countries and in the United States as a condensed literature review of that history demonstrates.

Lorenzen summarizes the emergence of library instruction from the time of the Great Library of Alexandria to the 17th and on through the 19th centuries. Instruction was discussed in early German library literature, noting library instruction's inclusion in German academic institutions, and into the 19th century with American library instruction pioneer, Melvil Dewey. Dewey proposed that librarians were teachers who provided instruction for others. This librarians-as-educators theme was also echoed by others at this time due to academic libraries increasing in numbers and complexity as the education system in America expanded into graduate level education. The first for-credit college course for bibliographic instruction was offered at the University of Michigan during the 1880s. The early 1900s saw a call for librarians to be trained as instructors (Lorenzen, 2001).

Research into the need for bibliographic instruction began to appear in the 1930s. The research highlighted the lack of knowledge of college students in the use of academic library resources. The library as the center of learning was emphasized and the role of the librarian as instructor and partner of curriculum professors was promoted. Lorenzen (2001, ¶ 19) states, "It would be easy to characterize the initial 50 years from 1880 until the early 1930s as the false dawn of the academic library instruction movement." The movement seems to have lost its drive in the following years as

librarians narrowed their teaching to consist of only library resource access skills.

A return to the need for bibliographic instruction was felt during the 1960s (Lorenzen, 2001). One reason for the resurgence was to assist students in their ability to ask relevant research questions, thus increasing success in accessing information. Lorenzen concluded that librarians have had to adapt library instruction needed by students to include the proliferation of electronic information resources. Organizations devoted to promoting library instruction were founded and research was again initiated to collect pertinent data. Current literature notes that bibliographic instruction has a vital role in the academic life of students and faculty. A demonstrated acknowledgement of that need is the required course for bibliographic instruction. One university's solution is a required seminar experience for sophomore students (Breivik, 1998). A librarian conducts the course that requires students to create a written product demonstrating use of multiple information sources, critical thinking skills, and analysis of the information collected. "Designed to provide students with a better understanding of the complexities of our knowledge-based society, this course will investigate the ways in which everyday lives and methods of scholarly investigation have been profoundly altered by technology and the information explosion (Breivik, 1998, p. 41)." This concurs with a basic tenet of library instruction that learning occurs optimally when the need for the instruction is evident (Dewald, 1999a). Course curricula that motivate students to desire information, to recognize the need for locating information, and to provide opportunities for the evaluation and use of the information found benefits students in their lifelong learning behaviors.

Instructional skills are noted in the literature as an area that librarians should be

cognizant of and should strive to continuously update (Stoffle & Williams, 1995). The challenge for academic librarians in the electronic environment is to retain the useful aspects of traditional library skills instruction and transfer these identified best practices to electronic teaching. This aspect of teaching is evident in the literature and encourages librarians to investigate, experiment, incorporate, and embrace the skills and techniques required for supporting successful learning of information literacy competencies in the online environment (Sharp, 2000; H. Thompson, 2002; Zhang 2002).

Mann Library of Cornell University identified the need for undergraduates to be able to access information through electronic sources. Posting a position opening for a coordinator of information was the beginning. The library's information literacy programs were developed, delivered, and studied. Librarian-guided instruction provided in a course-specific, face-to-face format was one of the delivery methods studied. Workshops on topics related to access and utilization of on-site electronic information resources were presented to supplement the classroom instruction. In-library tutorials were extended to workshop participants to allow supervised hands-on learning of products in Mann's electronic library of CD-ROM products. Areas of concern with these programs were discussed. Lack of student motivation, limited reach and depth with course-specific teaching, and the preference of hands-on learning to lecture were noted. A credit-earning class encompassing many topics held in an on-site classroom with opportunity for hands-on practice was offered as a solution to the noted concerns. And last, a complex curriculum-integrated program was developed that would involve students within one discipline to participate in instruction delivered incrementally

beginning in the freshman year and continuing through the senior year. Olsen noted that students who believe they were receiving credit for learning were more motivated to learn (Olsen, 1992).

Troutman echoed these ideals and believed they were being legitimized by writing, “as a formal discipline, with its own body of literature and designated practitioners, bibliographic instruction is a relatively recent phenomenon, dating from the early 1960s (Troutman, 2000, ¶ 2).” The need for library instruction within the academic environment was the impetus of that movement due to the explosion of information resources produced in the second half of the 20th century.

Library instruction is not unique to the United States as a literature review conducted by Lorenzen (n.d.) notes. His review of English language literature relating to library instruction worldwide underscored the use of bibliographic instruction in the countries of China, Australia, Nigeria, and Great Britain. Other countries represented in the literature, for example India, New Zealand, and Russia, noted a need for the development of library instructional programs. A study reported by Hepworth (1999) reviewed information library skills of students attending Nanyang Technological University in Singapore. The purpose of the study was to discover the abilities of the students in their information seeking and use skills. The results were used to provide recommendations for information literacy inclusion into the university’s curriculum.

Behrens states that the term ‘information literacy’ was first introduced by Zurkowski (cited in Behrens, 1994, p. 310) in 1974. The term was assigned to those persons who applied information use skills in the performance of their job the label of information literate. Two aspects described the information literate employee. One was

the utilization of skills to seek information. The second was the ability to utilize the information gathered to solve information need problems in the workplace. Others have altered the meaning of the term over time to reflect a dire need for information literacy among citizens for the preservation of democratic institutions. The definition evolved in the 1970s to include many concepts of information literacy but lacked skills and knowledge content. The 1980s definitions added references to computer literacy and expanded the definition to emphasize the library's role of instruction. The literature of this time period showed a marked increase in academic interest for developing programs for information literacy. For the 1990s, the American Library Association (ALA) definition was widely accepted in the academic library community. Librarians proactively sought to highlight the need for information literacy instruction and programs. The author concludes that librarians will continue to promote the issue and continue to attempt to partner with educators and administrators to incorporate the concepts and skills necessary to produce life-long information literate students (Behrens, 1994). This would naturally alter the concept of library into an information resource with those resources increasingly provided without concern for hours open, weekends, or holidays. Therefore instruction for the successful use of those resources must be provided in the same way. Although this method of library instruction may be viewed as a challenge by academic libraries, if embraced, it could allow the library to be the institution's leader in online learning (Debowski, 2000; Stoffle & Williams, 1995).

Theory of Library Instruction Learning Behavior

Two authors who have contributed multiple publications in the area of library instruction over a lengthy period of time are Jakobovits and Nahl-Jakobovits. The

authors' studies and writings cover many areas of information instruction and searching skills. Many of their publications are included in this literature review.

An in-depth discussion of the theoretical acknowledgement of user behavior as considered and reflected in library instruction was provided by Jakobovits and Nahl-Jakobovits (1987). The authors defined a systematic classification system, or taxonomy, of user behaviors, specifically in the affective, cognitive, and psychomotor learning domains with demonstrated behaviors within the three levels of identified library learning; specifically the orientation level, the interaction level, and the internalization level. The relationship between the domains and the levels along with the demonstrated outcomes were presented graphically in a matrix (Appendix A) that was intended to theoretically demonstrate the identity and relationships of the behaviors as proposed by the authors. The purpose of the matrix was to provide the library profession a means for standardizing effective library instruction. The authors noted that the advantage of utilizing the taxonomy to emphasize their theory would promote a scientific discipline and stimulate research and study into the library instruction field. The taxonomy incorporated leading instructional theory "following the work of Benjamin Bloom and associates on educational objectives," (Jakobovits and Nahl-Jakobovits, 1990). Jakobovits and Nahl-Jakobovits incorporated learning theory into the taxonomy and discussed learning motivators that librarians intuitively incorporate and respond to as they provide instruction to and ensure the success of students. Being cognizant of the taxonomy may relieve areas of what the authors refer to as student helplessness. This may include; pessimistic feelings such as the information resources not being useful, "library abulia" (Nahl-Jakobovits and Jakobovits, 1990, p. 79) or simply avoiding or

postponing the offered instruction, as well as the pervasive reluctance of some students to attempt anything directly related to computers and computer technology. To overcome these possible negatives, library instruction must be a positive experience that ultimately allows the student to feel motivated to pursue information-related activities and thus feel rewarded by successes thus creating incentive for continued searching experiences.

The authors updated the theory in a later publication to incorporate information literacy into the taxonomy using a systems approach to library instruction (Nahl-Jakobovits and Jakobovits, 1993). The systems approach allows all aspects of instruction to be viewed including the content of instruction along with the needs of the student and a process of accountability to ensure an effective program. A basic instructional design model that includes the following steps: conducting a needs analysis, determining goals and objectives, developing presentation methods, creating a means for evaluation of learning, pilot testing, gathering data on strengths and weaknesses on the instruction, altering the instruction based on data gathered, and looping back to the first step, allow a thorough process for developing a library instruction program. The matrix representing the taxonomy was also updated and describes the same ACS behavioral objectives as noted in the 1987 publication. The affective, cognitive, and sensorimotor objectives must be considered as dependent on one another for learning to be successful. In order to accomplish an objective (cognitive), the student must be motivated to seek the accomplishment and must see the value of it (affective), and must be physically able to perform the steps involved to complete the objective (sensorimotor). The information literacy matrix organizes the

objectives within the three levels of the original matrix.

The literature does not include studies testing the taxonomy in the online environment. Also missing are studies testing the taxonomy to determine students' levels of library skills after formal library instruction.

Information Literacy Standards

Standards are means for determining whether the goals and objectives of any endeavor are being obtained. When accountability for instruction effectiveness is a goal for an academic institution then standards become the measurement guideposts. Standards for information literacy were developed to assist academic libraries with the continued efforts to provide instruction for students.

In January of 2000 the Association of College and Research Libraries (ACRL) approved and published the *Information Literacy Competency Standards for Higher Education: Standards, Performance Indicators, and Outcomes*. These standards are intended to guide information literacy programs and define the outcomes that should be assessed to demonstrate acquisition of those competency standards by students of higher education.

The standards as published by the ACRL (2000b) are as follows:

1. The information literate student determines the nature and extent of the information needed.
2. The information literate student accesses needed information effectively and efficiently.
3. The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value

system.

4. The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.
5. The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

The standards document was followed by ACRL's (2001) and ACRL Instruction Section's (2001) publications titled, *Objectives for Information Literacy Instruction: A Model Statement of Academic Librarians* as noted earlier. The objectives provide academic librarians a pathway leading to and planning for the achievement of the standards.

The ACRL is a clearinghouse of statistical data about and for librarians and libraries of the United States. Most requests for statistical data are answered by the *Academic Trends and Statistics* information (ACRL, n.d.). It was noted that the ACRL only included in that information two questions regarding information literacy (Sonntag, 2001). The two questions requested counts of the number of bibliographic programs delivered and number of students who participated. This minute amount of data does not begin to represent what is actually being offered, within what parameters, and how the effectiveness of the programs is studied. A study aimed at determining the extent of information literacy programs provided at colleges and universities was conducted by the ACRL in 2001. The *National Information Literacy Survey* was posted online on ACRL's Web site in May 2001 and notification via email was sent to approximately 2700 two-year and four-year institutions (ACRL, n.d.). About 26% of the possible institutions

resulting in 710 respondents produced the following data. The *Information Literacy Competency Standards for Higher Education* document is being discussed and reviewed at many institutions. Some institutions identified specific requirements ensuring the implementation of the standards for students while others are in the process of revising the institution's mission and policies for inclusion of the standards. Of the institutions currently providing information literacy instruction, most noted an increase in the use of and the evaluation of information retrieved and a higher level of critical thinking evident in assignment products. Most still felt that the library and librarians should oversee the instruction while others reported a collaboration of instructors and librarians. A significant finding of the study revealed the desire of colleges and universities to receive guidance to support their efforts to provide effective information literacy programs.

Standards from the Academic Perspective

The regional academic accreditation commissions appear to be cognizant of the need for developing and providing user education to achieve information literacy (G. Thompson, 2002). The Middle States Association Commission on Higher Education (CHE) embraced the vision to promote bibliographic instruction and information literacy among its institutions of higher education (Simmons, 1992). Outcomes assessment was emphasized along with determining the effectiveness of the overall library program. In the 1990 revision of CHE's standards, the intended effect of integrating information literacy into the standards was to be regarded as an area worthy of recognition and study in the reaccreditation process of an institution. CHE along with the ACRL and the Western Accrediting Commission for Senior Colleges and Universities (WASC)

conducted a study specific to information literacy (Breivik, 1998). The *Data Collection on Information Literacy Programs at USA Higher Education Institutions* study's purpose was to provide a view into the status of information literacy integration within academic institutions. The five questions posed in the survey related specifically to aspects of information literacy. The results from the 1994/1995 survey noted that at least 22% of the respondents were cognizant of and pursuing programs for information literacy at their institutions. Unfortunately, 55% answered negatively to all five questions causing the authors of the study to assume that those institutions had not yet incorporated information literacy into the institution's curriculum.

A content analysis of the current and draft standards documents published by the regional accreditation commissions was explicated in *Comparing the Regional Accreditation Standards: Outcomes Assessment and Other Trends* by Gratch-Lindauer to describe "how outcomes assessment is being described and whether specific outcomes are included that relate to libraries and learning resources (Gratch-Lindauer, 2002, ¶ 3)." A trend to incorporate criteria referencing libraries and information literacy into various standards and with various outcome measures was noted in a number of the documents and was specifically promoted in most of the documents reviewed. The precepts and means for documenting measurements and assessments were an integral and integrated part of most regional standards. Gratch-Lindauer's work highlighted the fact that academic libraries and the user education they provide must be ingrained in the academic endeavors of not only the students but also faculty and administration.

Characteristics of Excellence in Higher Education: Eligibility Requirements and Standards for Accreditation is the standards document for the Middle States

Commission on Higher Education (2002). A lengthy paragraph emphasized the importance of information literacy to the overall academic experience and included the language found in the ACRL standards. A specific characteristic of the narrative of the standard encompassing the information literacy text was that collaboration between the library and the faculty should enhance the information literacy skills of students.

Discussion of the emphasis on information literacy and the regional institutions' self-study responses was included in Ratteray's article published 2002. Ratteray concluded that there are numerous areas within a higher education institution that were favorably influenced and affected by the revised standards.

The New England Association of Schools and Colleges (2001) document, *Standards for Accreditation*, has a standard specifically for libraries and their resources. The six statements included in this standard reference the need for information resources and instruction for the use of those resources to be available to students regardless of where the students are geographically located. Information literacy was mentioned, demonstrating this commission's acknowledgement of its importance.

Libraries are grouped with other learning resources in support of student learning for the *New Policies and Policy Revisions Most Recently Approved by the Board of Trustees of the Higher Learning Commission* as published by the Higher Learning Commission (2003). The policy did not reference information literacy specifically but did allude to the necessity of providing resources to enhance and support student learning. The Higher Learning Commission is of the Commission of the North Central Association of Colleges and Schools.

For the Commission on Colleges & Universities of the Northwest Association of

Schools and Colleges (1999), a single statement incorporated the need for instruction so that students, faculty, and staff can access information resources effectively. The *Accreditation Handbook* did include the library and its resources as a separate standard.

The *Principles of Accreditation* from the Commission on Colleges Southern Association of Colleges and Schools (2003) acknowledged the importance of information literacy instruction. One statement was directed to library instruction and is one of three under the library category, thus emphasizing its importance.

The Accrediting Commission for Community and Junior Colleges Western Association of Schools and Colleges (2004) included the library within the section for student learning. Instruction was noted as an activity required for information and technology resources to be utilized effectively. The document, *ACCJC Standards*, was recently approved as noted by the publication date.

The position statement of the American Association of Community Colleges also encouraged the inclusion of programs “that provide an organized universe of knowledge to users (American Association of Community Colleges, 2002, ¶ 1).” The necessity of information literacy and the services provided by the library and the librarians were noted as vital to the academic environment and to life-long learning.

Gratch Lindauer (1998) noted the importance of the accreditation agencies, professional organizations, and institutional goals in the overall performance and evaluation of the library. This information, however, tends to treat the library as an autonomous entity. Expressing the need for a different approach, the author published a literature review highlighting publications that viewed the library, its resources, and its

effectiveness as a contributing partner to the educational assessment of the whole institution. Categories of areas contributing to performance outcomes that can be evaluated and documented were discussed and included those associated with the teaching-learning role necessary to libraries. Noted were institutional outcomes that libraries directly contribute to.

Hernon and Dugan discussed in their monograph, *An Action Plan for Outcomes Assessment in Your Library* (2002), the critical need for libraries to include themselves in institutional effectiveness assessments. Specifically, libraries must demonstrate that services provided have a direct impact on students, improve students' academic performance, and increase an institution's faculty research efforts. The cognitive and affective outcomes must be considered and must then be measurable.

Information Literacy Instruction Online

Traditional library instruction is accomplished with face-to-face training sessions where students listen to the instruction and then practice the skills learned in order complete a required assignment. Currently many students enrolled in higher education institutions do not enter the campus library but must have the library skills necessary for searching, locating, evaluating, and utilizing information and information resources available to them online for the purpose of collegial research and coursework requirements (Dewald, 1999b; Dewald, Scholz-Crane, & Booth, 2000). Gandhi reviewed literature related to distance education students and academic libraries. Pertinent in this paper was the review of literature regarding the training of librarians for today's online environment and the emphasis for academic librarians to be "system interface designers (Gahndi, 2003, p. 140);" a role that would include creating online tutorials for

library skills instruction.

There are numerous online programs available that claim to provide library instruction electronically and most may be accessed through academic library sites. Discussions on many of these instructional programs are found in the literature. These discussions generally provide a description of the creation of the program and details on the development and content. Usage figures are occasionally provided. Data on demonstrated success of these programs is lacking.

Such a discussion is published by Germain and Bobish (2002). Figures demonstrating the dramatic increase in online instruction and number of students accessing that instruction were provided. A literature review of online bibliographic instruction efforts was included noting the flexibility of online instruction, its adaptability to tradition library instruction content, and its suggested success in teaching the mechanical skills and search strategies needed for electronic resource information retrieval. What was lacking was the teaching of evaluative concepts to allow students to critically review the information retrieved. The article continued with how-to content, a discussion of evaluation consisting primarily of student electronic feedback, and a promotion of the Texas Information Literacy Tutorial (TILT) as a “model interactive Web-based tutorial (Germain & Bobish, 2002, p. 85).”

Examples of online instruction programs for information literacy were numerous in the literature. Representative publications included Jacobs’ (2001) review of the ‘Speakeasy Studio and Café’. This program was designed and developed at

Washington State University to be a for-credit course utilizing interactive discussion opportunities in conjunction with a traditional face-to-face classroom setting.

Assignments, discussions, and resources were available online encouraging students to incorporate critical thinking skills into their approach to the research assignments and to their course-related products. Students posted their work in response to the assignments and were then encouraged to discuss and critique the processes involved and the products of the other students. According to the author this process applied behavioral learning theory by allowing the students to learn through collaboration and discovery. The process moved the student through the information literacy steps beginning with asking the right questions, accessing information resources, evaluating the resources, and finally creating a product. One of the benefits noted by the author was the online environment encouraged the use of technology, a critical skill for today's students.

Information literacy needs were the impetus for the San Francisco State University to create Online Advancement of Student Information Skills (OASIS) (Castro, 2002). The process of development followed that of most instructional programs including planning for the program and marketing it. Castro noted that the institution had future plans for overall assessment of the success of the program's effectiveness but that student feedback and review of quiz scores showed a positive trend.

The Texas Information Literacy Tutorial (TILT) is an online tutorial designed to provide library instruction specifically for courses with an introductory level research component and was discussed and referenced often in the literature. TILT was developed at the University of Texas to be "an educational site focusing on fundamental

research skills (TILT, n.d.).” The intended audience was undergraduate students. The *General Libraries*, a newsletter published by The University of Texas at Austin noted;

A total of 15,840 students registered and took the online Texas Information Literacy Tutorial (TILT) during 2000-2001, an increase of 94% over the previous year. The tutorial software was also made available to institutions around the world in early 2001 under an Open Publication License. The program has been recently translated into Dutch (The University of Texas at Austin, 2002, p. 2).

The Library Instruction and Information Literacy Services of the University of Texas at Austin began development of TILT in 1997. It was designed for the purpose of providing freshmen students the opportunity to learn basic research skills in an environment available to them anytime and regardless of geographic location or major field of study (Dupuis, 2001; Fowler & Dupuis, 2000; TILT, n.d.). By providing the basic instruction in this format, the specialized skills of the librarians could be incorporated into curricula for more enhanced library instruction. The TILT program was intended as a starting place for instruction, not as a complete program.

Planning for the program included surveys on the level of technology at the UT System campuses, current library instruction, the interest of faculty in a possible tutorial, the skill level as self reported by freshmen students, and the competencies identified by public service librarians. Usability studies were employed to assist designers with end-user concerns. The result of this input and collaboration was the TILT program.

TILT instruction begins with an introductory page discussing some Internet myths. The instruction is presented in three separate modules focusing on “selecting appropriate sources, searching library databases and the Internet, and evaluating and

citing information (Dupuis, 2001; TILT, n.d.).” The modules have the following characteristics: a navigation bar at the top and the bottom of each page with the center containing instructional content, interactive components, and graphics. The instructional content includes general discussion of the module topic and a list of the learning objectives. TILT customizes the instructional content and interactive components by allowing students to select one of six topics that could be of interest to an undergraduate student. Allowing personal choice enhances the learning potential of the program. The “content emphasizes transferable research and critical thinking skills (Dupuis, 2001, p. 22)” in recognition of these skills being associated with information literacy competencies. A short quiz is the concluding activity for each module and includes immediate feedback for the student. Each module is generally expected to take about 30 minutes to complete.

The program is available to those who wish to download it through the Open Licensing of the TILT file. An information page includes detailed information on such topics as site specifics concerning design, technological compatibility, and ADA considerations. The ability to customize the program to reflect the needs of an institution is a positive feature offered by the program. The prevalence of the program’s use is noted in a university publication stating that “over 500 domestic and 92 international libraries have now downloaded the TILT software to customize for users at their institutions (The University of Texas at Austin, 2003, p. 2).”

The tutorial is available to all who wish to view it. The interested user may complete the modules as a visitor to the site or may register and have the participation documented. This documentation ability includes the option of emailing the module

quizzes. There are two technological levels for viewing, either in full mode with high interactivity or in 'lite' mode that does not require any additional software (plugins).

One aspect of the program missing from the literature is a review or study of the effectiveness of the instruction. The quiz scores themselves are an immediate measure of the students' recall of the content but not a measurement of the influence the instruction may have on future motivation or products of the student. Noting this omission, Orme conducted a study on the knowledge that student's retained and could use after the instruction. The study was based, as so many are, on comparing students in face-to-face classroom environments with skills taught through different instructional deliveries; in this case traditional, online, a combination of the two, and no instruction at all. Every student in the study was then interviewed in person and individually. The conclusion was that demographics such as number of credit hours earned, that environment of learning, and that the opportunity for students to use the learning had impact on the retention of learning post-TILT. The study's methodology focused on skill recall not integration of learning as demonstrated by a product or paper (Orme, 2004.)

Assessment Methods and Measures for Library Instruction

The literature reflected publications on the assessment of students for varying aspects of the information literacy competencies. A representative sample of the variety of evaluative publications is included. Barclay (1993) noted that assessment can provide both hard data, such as that derived from valid testing and usage statistics, and soft data, such as anecdotal and survey data. Combining these methods would overcome validity and bias issues.

A unique method discussed in the literature as means for assessing a library

program's effectiveness was published by Eckwright (1993). The assessment was based wholly on students' feedback. The feedback was elicited on three areas: self-reported confidence in information seeking, the effectiveness of the instruction, and the value and areas of possible improvement of the instruction. The measurement method did not produce any data reflecting skills learned and was so subjective that the author noted difficulty in evaluating the students' comments.

Information literacy competencies involve concept learning in contrast to procedure learning according to Cherry, Yuan, and Clinton (1994) who noted that concept learning is the current trend in educating library users in the utilization of the online public access catalog (OPAC). The authors developed a computer assisted (CA) tutorial that was accessed on a stand-alone computer system and was available to undergraduate library users. Two studies were conducted to determine the effectiveness of the tutorial in improving students' performance in OPAC searches. Transaction logs were analyzed, and the student participants of the first study performed markedly better after the CA tutorial than those who had not viewed it while the student participants of the second study performed only as well as those who had not viewed the CA tutorial. The causes of the differences in the results for the two studies were identified as differences in the participants of the two study groups and differences in the OPAC software products. The second study group participants consisted of students more familiar with OPACs and OPAC searching than the first group. The second group was also assumed to have an advantage over the first group due to different OPAC software. The second study employed a software product from a different vendor that was considered to have a friendlier user interface therefore

negating the need for the CA tutorial.

This method of study was replicated by Michel (2001) using computer-assisted instruction. Students and faculty were asked to respond to a survey that asked about the Web-based library instructional guide developed by Radford University's academic librarians. The survey requested responses on the perceptions about the guide with a noted result that students stated they preferred the online guide to traditional classroom instruction although they did not wish for the online guide to be the only instructional option. The conclusion of the study discussed the need for the survey to be revised and continued for long-term review. Also, the lack of current literature on assessing effectiveness causes concern.

All of the efforts of bibliographic instruction and information literacy are for naught when the user/student does not learn, integrate, and utilize the skills presented. Bober, Poulin, and Vilen (1995) produced a literature review of works published beginning in 1980 through 1993 on evaluating library instruction. The authors noted the study was a continuation of a similar study conducted by Werking published in 1980 (cited in Bober, Poulin, & Vilen, 1995, p. 54; Werking, 1980). With information literacy skills increasing as a necessary component for academic programs, the need to assess a student's competency in those skills is also necessary. The authors' literature review evaluated the publications in terms of four areas: why programs were evaluated, the depth of the evaluation, evaluating the various characteristics of the programs, and the evaluation methodologies. Evaluating programs in order to improve them or to promote accountability and assessment of their effectiveness were goals identified as important evaluative requirements. The authors reported that three evaluation methodologies

were generally employed. The psychometric or pre/posttest method was employed and was considered a weak method, lacking in standardization and only testing short-term retention skills. The sociological or questionnaire method was widely employed but could be biased depending on how questions were worded, how the rating scale was presented, and when the survey was administered. The goal-free or illuminative evaluation was the broadest of the three and viewed the effectiveness of a program as a characteristic of the participants' satisfaction. Various tools were combined in the illuminative form of evaluation including those just noted along with observations, activities, and discussion. The authors concluded that evaluation can be a complex and even personal undertaking. In general, there was a lack of systematic evaluation of the effectiveness of information literacy programs due to time, cost, and methodology knowledge within the library environment. The need for solid evaluations was moving to the forefront of the library profession due to academic institutions' emphasis on an information literate graduate.

Ragains (1997) noted that evaluation of library programs should not make the mistake of tying the performance of a librarian's single traditional classroom instruction to an evaluation of the librarian. Satisfaction surveys could be responsible for such a mistake in assessment. Instead, methods of evaluating learning should be developed and used. Through a national survey of bibliographic instruction librarians, a few assessment trends emerged. One trend was the use of responses from students on their satisfaction with library instruction. Several issues with this type of evaluation were noted, such as the lack of time between the instruction and the survey; thus, no allowance of time for the students to use the skills taught. Also, questions about the

librarian's presentation style may be too subjective and not relevant to what the student learned. Peer review and instructor evaluations were also discussed, but these methods do not assess student learning either. Providing instruction through online tutorials and electronic instructional guides was suggested by the author as a more effective manner of delivery. These delivery methods remove any librarian-specific issues and allow methods of assessment of learning to be developed specifically for skills learned through the instruction.

Focusing on the librarian's presentation along with bibliography reviews and student surveys were the multiple perspectives of measuring library instruction effectiveness used by Webster and Rielly (2003). Again, the study involved only traditional classroom library instruction but discussed the need for including online instruction in the evaluation of learning process.

Assessment of information literacy competencies was discussed by Breivik (1998). The assessment outcomes may be viewed as a multilevel process. The student project level is the basic graded product. This can be made an important assessment tool when course syllabi include references to incorporation of qualified information resources along with other information literacy competencies and the instructor reviews the product with information literacy competencies in mind. The learning assessments conducted to determine the degree of learning a student has attained was a more difficult level but could be accomplished by: a portfolio method, reviewing a collection of student works over the academic life of the student, or by the means utilized to determine levels of competency in the student's major field of study. An institutional level of assessment should be conducted to assess the effect of the information literacy

instruction across the curricula, such as institutional effectiveness data was collected and assessed. Although the author discussed these assessment levels without specifically referring to the online delivery method of teaching, the assessments would still apply.

Roselle (1997) employed ALA's *Evaluating Library Instruction* instrument to evaluate an Information Literacy Skills course. The study employed three different aspects in evaluating the program. The students, the faculty, and the students' products were all reviewed. The ALA instrument was employed to provide a summative or long-term effect evaluation of the course although some formative, or data for improvement, evaluation was included. Roselle echoed the methodology dilemma discussed previously and noted in the conclusion that closed-end questionnaires and surveys provided limited information about the effectiveness of a program. Employing open-ended questions and discussion allowed students to relate more information that could then be analyzed to determine the impact of the learning experience. The second aspect was the perception of the faculty that the instruction was worthwhile. The survey answered by the faculty implied that they felt the program had influenced the students' library use behavior and their course work products. And last, a review of senior students' research paper bibliographies was conducted. The author noted little difference between the papers of students who had received a short database-specific bibliographic lesson and those who had participated in the three-year 30 hour integrated Information Literacy Skills course. The conclusion noted that evaluation should be summative, employing a variety of tools so as to glean the broadest information about the life-long information literacy skills and experiences of students past the academic

years.

Roselle noted that library evaluation generally falls into two types: the formative evaluation and the summative evaluation. A study was conducted by utilizing the Evaluating Library Instruction instrument to provide a summative evaluation of the Information Literacy Skills Program as taught to nursing students at the University of Botswana. Achievement of the information literacy skills was demonstrated by the students' scores on the course required assignments and tests. A generic student assessment survey was completed by the students to assess general course topics learned. These two measurements occurred during or close to the time of instruction and the scores reflected favorably on the effectiveness of the instruction program. To determine whether the instruction provided a long-term effect on the information literacy skills of the students, various measurement tools were utilized seven months after the library instruction occurred. A student survey was developed and administered to the students with closed-ended questions and a comments space. The author stated that the closed-ended questions did not provide a summative evaluation of the instruction but the comments were insightful and this type of qualitative measure may have greater evaluative strength. A survey of nursing faculty on their observations on the students' achievements of the lessons of library instruction provided some evaluative data, but again, it was the comments that provided the most useful data. The third tool utilized for the study was a comparison of student produced bibliographies. The bibliographies of the students completing the library skills instruction were compared to those of students from previous years. The comparison did not show the results sought by the author, but the tool used in conjunction with qualitative tools such as interviews would lend greater

summative results and therefore provide better indicators of effectiveness (Roselle, 1997).

The method of evaluating students' products was discussed in many of the above noted publications. Bibliographies lend themselves to evaluation of library instruction due to their being a product of the student that can be obtained prior to and after library instruction, can be evaluated per a set of criteria, and could even be utilized as an evaluation of a student's information literacy competencies demonstrated during the student's years of instruction at an institution. A discussion of the various aspects of utilizing bibliographies for this purpose was found in *Toward a Methodology for Evaluating Research Paper Bibliographies* by Gratch (1985). The author reviewed previous studies using various criteria for evaluating student produced bibliographies. Gratch discussed various influences that may affect this method of library skills assessment such as instructor influence, guidelines to the students for writing the paper and its bibliography, and differences in evaluating the bibliographies due to subjective influences. Ensuring that the criteria utilized for the evaluation corresponds to the skills being evaluated decreases the negative aspect of these various issues.

Many studies were cited in the literature using bibliography review as the primary method for assessing effectiveness of library instruction. Kohl and Wilson (1986) referenced a number of previously conducted studies by King and Ory and by Person to support their study to determine whether the content of library instruction has an effect on the student's ability to internalize and apply the skills. The overall library orientation and instruction were the same for the two groups. The difference was in the approach to using information resources. One group was taught the more traditional method by

emphasizing what the tools for research are: beginning the search with traditional resources such as encyclopedias and the use of the card catalog. The second group was instructed to consider what they were researching and then determine the tools that would best provide the supporting data. The assessment method was the review of bibliographies that the students in the two groups produced based on three identified criteria. The bibliographies were scored by a librarian and by a writing instructor. A t-test was used to determine whether there were significant differences between the scores of the two groups. The data demonstrated that there was a significant increase in the scores of those students who received the cognitive instructional method rather than the tool-specific method.

The bibliographic method of assessing library instruction was further reviewed by Young and Ackerson (1995). A literature review in the publication discussed multiple studies using this method of assessment. Three criteria identified in an earlier study conducted by Kohl and Wilson were used to replicate that study with an intent to create an instrument to standardize the scoring of the bibliographies. The emphasis on the scoring instrument and its use in the study led the authors to a discussion of the following needs: the need to correlate the grade of the research paper to the score on the rating; the need to ensure that students are instructed on the areas rated such as the differences of scholarly and popular journals, correct style of citations, and variety of resources; consideration of discipline-specific affects to the criteria; and the use of librarians only as raters. Overall the method was one that can be replicated for future studies and can be refined and adapted to various instructional deliveries.

Evaluating Online Tutorial Learning

Few methods of evaluating library instruction programs delivered online were discussed or reviewed in the literature. This is obviously an area of concern, especially in the current academic environment that requires outcome measurements and assessment data. Gandhi (2003) expressed the opinion that academic librarians must collaborate with the distance learning instructors to integrate online library skills tutorials so that an assessment of the students' products reflecting the utilization of the learned skills could occur. This product assessment along with measurements incorporated into the tutorial program could fulfill the assessment data requirement.

French created an evaluation tool that reviewed many aspects of computer-assisted instructional (CAI) software based on learning theory for nursing educators. The nine categories identified for the evaluation are: learning principles beginning with determining the student's readiness for CAI instruction and repetition of content, positive reinforcement, active student participation, organization of material, learning with understanding, feedback, providing the student with acknowledgement of correct answers and the reasons for wrong answers, allowance for individual differences, and motivation and personal values of the student. Noting that computer enhanced instruction would be evolving into and permeating more of curriculum, the need for analysis and assessment of both the product and the process was necessary (French, 1986).

DeMott utilized French's evaluative tool and expanded it to include criteria specific to evaluating online courseware. The criteria related to the online characteristics were: ease of use, navigation, mapping, screen design, knowledge space, information

presentation, aesthetics, and overall functionality. In-depth definitions and their relationship to the online environment for each of these criteria identified by DeMott (1996) were published on the site *Definition for User Interface Rating Tools* offered by the University of Maine (n.d.).

Noting that assessment of learning should be derived from the objectives defined for the student, Zhang described a review of an online course that incorporated information literacy objectives and was delivered through the software product WebCT. This product allowed for instructor posting of information, exercises, auxiliary materials, tests, etc. and most importantly allowed students to communicate with not only the instructor but with one another. Creating a cycle of learning through assessment as a positive feedback loop benefits not only the student but also the instructor. This assessment cycle includes pre- and posttesting, analysis of an issue, location and evaluation of information resources, and most importantly the communication of this process through the interactive aspect of WebCT. The review noted a 19 percent increase in the posttest scores of the students but suggested that the sample population may have been too small to suggest a statistically significant result (Zhang, 2002).

A publication by Blakesley Lindsay, Cummings, Johnson and Scales (2006) described a review of the Washington State University Library Instruction Department's online tutorials developed to assist students with the institutions' library resources. Of interest in this article was the authors' notation that assessment was a factor in the in development of the tutorials and that the assessment was to be imbedded. The authors' concluded that assessment of learning was difficult to determine and that previous library skills were affecting the results. The assessment tools used appeared to assess

the online library instruction tool itself and immediate recall skills rather than skills the students would need to reflect information literacy competencies.

In conclusion, the literature review includes evaluative studies and publications based on computer assisted instruction, but most of these studies were conducted within the physical library environment. The literature is lacking when a search for assessment methods and/or tools related specifically to measuring of the effectiveness of online tutorials accessed outside the library environment was sought.

CHAPTER 3

METHODOLOGY

Introduction to the Study

This study is a descriptive study to determine whether student participation in an online library instruction tutorial, specifically, the Texas Information Literacy Tutorial (TILT, n.d.), has an effect on demonstrated information literacy competencies and on the level of library research strategies for participants enrolled in core curriculum courses at an institution of higher learning. The instruction and related activities are incorporated into the updated taxonomy of library skills based on Jakobovits and Nahl-Jakobovits taxonomy (1987), a library learning foundation theory demonstrated through a matrix format with three levels and three domains of competencies as presented in Appendix B. The measurements used for the study will reflect a student's level within the taxonomy matrix.

The courses identified for use in the study are offered both in a traditional classroom and through online instructional delivery. The study effect is measured by comparing the differences between post-instruction scores and pre-instruction scores on a library skills assessment questionnaire and by comparing the criterion-based scores of an evaluation of student-produced bibliographies created before and after participation in online library instruction. To ensure the online instruction occurred, students were requested to complete and forward the library instruction quiz scores for inclusion in the data collected for review.

The data collected for statistical comparisons of significance were submitted by

the study participants through pre- and post-instruction library skills questionnaires and two bibliographic activities, along with the three TILT instructional module quiz scores. The data collection approach and statistical comparisons follow Barclay's (1993) suggestions that effectiveness studies must be meaningful to be viewed with any validity from both within and outside the information science discipline. Barclay states that using the methods of testing and surveying along with a review of bibliographies, a method he terms as 'evidence of use,' provides substantive data for library instruction evaluation.

Update to Taxonomy of Library Skills and Errors

The matrix developed by Jakobovits and Nahl-Jakobovits and discussed in the literature review provides a framework for evaluating library instruction in the current electronic environment. The taxonomy of library skills and errors (Jakobovits and Nahl-Jakobovits, 1987, p. 207) was updated with permission (ALA, personal correspondence, March 18, 2003) by the researcher. The adapted matrix is reflected in Appendix B to demonstrate its current relevance to library instruction. The framework is invaluable for providing direction to those creating online library instruction so that obtaining the competencies described in the updated taxonomy can be accomplished.

The competencies identified in the *Objectives for Information Literacy Instruction: A Model Statement for Academic Librarians* (ACRL, 2001a) were reflected in the taxonomy. The five competency standards detail expected outcomes related to a number of performance indicators designed to determine a student's information literacy. Thus, the objectives were a complementary model of the taxonomy and its

competencies as identified within levels and domains.

Incorporating TILT into Taxonomy

Texas Information Literacy Tutorial (TILT) lends itself to incorporation into the taxonomy by assisting participants in attaining the skills identified by the taxonomy. Level 1 competency is demonstrated by the students' motivation to participate in the study, to access and respond to the initial study activity, and to use technological skills and physical ability to complete the study's online activities. Level 2 competency is demonstrated by utilizing, navigating, participating, and completing the three instructional modules available through TILT and submitting the completed quizzes to the researcher. Level 3 competencies are demonstrated by the students' incorporating the skills learned through TILT to improve their responses to the study activities completed post-instruction.

The effectiveness of TILT itself is assessed through a review of the module quizzes, the percentage of participants that complete the entire TILT tutorial, the increase in perceived library skills behaviors self-reported through the questionnaire, and last, through a student-created course product, specifically bibliographies, that function as an outcome assessment measurement. Student created bibliographies are reported in the literature as an evaluative tool to assess library instruction (Gratch, 1985). The use of more than one assessment tool to determine the online tutorial's effectiveness is essential to demonstrating that learning has occurred.

Population of Study Participants

The population of students that could possibly be included in this study was very large. Central Texas College is a primary provider of community college level courses to

military personal worldwide along with a general student population attending the central campus geographically located adjacent to a military base. The population is not consistent in its enrollments due to the transient nature of the large student pool. For this reason a minimum of 50 students enrolled in traditional delivery courses and 50 students enrolled in online delivery courses was considered the minimum sample amount.

In an experimental study there are generally two types of study groups: one is designated to receive the treatment and one is designated the control group that does not receive the treatment. The use of control groups in the library instruction environment is discouraged since it would mean the exclusion of library instruction to some participants, a condition considered more negative than the lack of a control group (Barclay, 1993). A dissertation research study conducted by Zahner (1992) included two study groups with both groups receiving a separate library instruction intervention. Differences in the students' research paper bibliographies were measured to determine the effective library instruction method. This study followed these precedents. All students who agreed to participate in the study accessed the same online library instruction tutorial and the differences studied are noted in the hypotheses.

The study participants were Central Texas College (CTC) students who enrolled in specific core curriculum courses. The courses were considered freshman level and were; ENGL 1301 and ENGL 1302, GOVT 2301 and GOVT 2302, HIST 1301 and HIST 1302, and SPCH 1315. The courses were offered on-campus in a traditional face-to-face classroom delivery method during regular and summer session semesters and online through CTC's distance education portal through terms of eight weeks that begin

monthly. Participants included both CTC enrolled students and eArmyU enrolled active military students as both these groups were included in the same classes. All students enrolled in the identified courses were possible participants in the study. The sample consisted of those students who agreed to participate in the study by responding to and submitting the first study activity, thus the students self-selected.

Study Preparation

Questionnaire Pilot

Landrum and Muench proposed the development of an instrument to consistently measure library research strategies of undergraduate students (Landrum and Muench, 1995). They conducted a series of studies to develop the Library Research Strategies Questionnaire and test it for reliability and validity. A study of responses of students to interview questions evolved into a pool of questions that were then used in a subsequent study to determine each question's reliability. A third study replicated the second resulting in the questionnaire's reliability and validity in measuring library research strategies as it was intended to do. The authors stated the questionnaire is designed to assess library instruction and its use "should focus on measuring change in library behavior over time" (Landrum and Muench, 1995, p. 1623).

The questionnaire instrument was adapted, with permission (E. Landrum, personal correspondence, October 20, 2003), to the information resources available online at the Oveta Culp Hobby Memorial Library of Central Texas College (OCHML). Due to these changes, the researcher conducted a pilot test to determine the clarity of the questions and the questions' correct identification and description of the online information resources available. The demographic questions

were included in the pilot test to ensure clarity of the text (Appendix C). Ten printed questionnaires were provided to various OCHML personnel, including work-study students and professional personnel, with a request to make note of any items or terminology that might be incorrect or confusing. Nine of the questionnaires were returned and the comments were minimal. A typographical error was identified and corrected.

Bibliography Scoring Inter-Rater Reliability

The researcher intended to score the pre- and post-instruction bibliographies. An inter-rater reliability test was conducted to demonstrate the reliability of the researcher's ability to score the bibliographies using a specific measurement tool. Thirteen sample bibliographies were scored independently by the assistant library director of the OCHML, a professional librarian with an MLS degree, and by the researcher.

The results were evaluated using Cohen's Kappa (Vogt, 1999) to measure the agreement between the two raters' scoring of the bibliography criteria. The statistical percentage of agreement of .73 was determined to demonstrate inter-rater reliability as it was greater than the minimum required percentage of .70 (Cohen's Kappa, n.d). Thus the researcher elected to solely score the bibliographies submitted for the study.

Creation of the Study Web Site

The study Web site was designed by the data specialist at CTC with Web design training at the request and with the oversight of the researcher. The site was hosted on a CTC server with the assistance of the CTC Web master. The main page of the study Web site is viewable in Appendix D.

Procedures

Initiation of the Study

Identified courses were selected through prior department chair knowledge and instructor notification. The researcher sent instructors an electronic letter (Appendix E) describing the study, the possible study participants, and instructions for communicating the request for study participation to the students. The electronic letter to the instructor contained the URL for the study Web site to provide to the students.

The participants accessed the study Web site where they viewed a welcome message (Appendix D). The University of North Texas' Institutional Review Board (IRB) required notifications for the study participant that course grades would in no way be affected by any part of the study, identities would be kept anonymous, and that the study was reviewed and approved by the IRB were included in the welcome message. The message included instructions to access the Pre-Instruction Questionnaire link from the study Web page. Included in the Web page for the questionnaire was the statement of informed consent and a place for the participant to enter their study participant code; a two-letter code consisting of the participant's first-name and last-name initials followed by the last four digits of their social security number. This format allowed for each participant's code to be unique. Those agreeing to participate and who submitted the pre-instruction questionnaire received an email acknowledging participation, verified the study participant code, and included study instructions for the next activity (Appendix F).

The researcher recorded the study codes and the data contained in the

submitted questionnaires into an electronic spreadsheet. The data from those enrolled in traditional courses and those enrolled as online students, as self reported by the students, were in separate spreadsheets. The spreadsheets contained the lists of the sample population and demonstrated the participants' competency of the Level 1, Orienting to the Library affective, cognitive, and psychomotor domains of the taxonomy of library skills by indicating that the students had motivation to learn more about library skills and information seeking and were willing and able to learn those skills through an online instructional program.

Timeline

The time period of data collection included two traditionally delivered summer semesters of five weeks each and three online course terms of eight weeks each. Once data was collected for one of the instruments or activities for a particular participant, subsequent data for that measurement was not accepted. This process allowed for variances in the class length of online and traditional courses and in the instructors' scheduling of the course papers and bibliographies.

Pre-Instruction Questionnaire and Demographics Instrument

The Library Research Strategies Questionnaire previously discussed was the first activity that the participants accessed through the library study Web site. The questionnaire was used as the pretest and the posttest instrument to measure differences in the library strategies behavior of the sample participants. The questionnaire items have various values associated with the possible choices. The choices are coded to reflect a low value for a low or lack of confidence, knowledge, skills, or use of the library and its resources, and higher values reflecting an increasing

presence of the behaviors.

The items in the questionnaire are categorized into four topic areas: person-specific, the student's confidence in his/her use of the library as demonstrated by items 5, 11, 13, 17, 21, 22, 26 28, and 30; library-specific, the student's use of library resources demonstrated by items 2, 3, 6, 7, 12, 14,16, 18, 19, 20, and 31; paper-specific, paper writing knowledge as demonstrated by items 1, 9, 24, 25, 27, and 29; and reference-specific, resource-specific knowledge demonstrated by items 4, 8, 10, 15, and 23.

In addition, demographic data was requested of the participants along with the pre-instruction questionnaire. The demographics data collected included age, gender, whether first time or returning college student, English as primary language, use of public libraries, use of academic libraries, use of technology, computer literacy, use of the Internet, and employment status. Added to this general list was a question requesting the military status of the participants. This data was requested to determine the percentage of participants who were active military since CTC is a provider of education to the military through many Memorandums of Understanding and through participation in the eArmyU program. These students have constraints affecting their participation and completion of their courses and coursework and hence of the study.

Instructions for accessing and completing the questionnaire and the demographic section were included in the welcome message on the study Web site. The pre-questionnaire had text boxes for the participant to fill in for the study code, the email address of the participant, and whether they were enrolled in a traditionally delivered or

online course. The Web page had a submit button allowing the data to be submitted as an email to the researcher. The email was stored in an electronic file. The participants' responses were kept with the identifying participant study code attached to their data in the spreadsheets. An acknowledgement email (Appendix F) was sent to each participant with instructions to return to the study Web site for the next activity of the study.

The text box for students to enter their email was included on the pre-questionnaire form to ensure anonymity. For students who did not fill in that field, a default email address was entered and their data was not included in the data collection because there was not a means for contacting that student.

Pre-Instruction Bibliography

The participants received the instructions for submitting the pre-instruction bibliography in an email acknowledging their submission of the pre-instruction questionnaire and demographics document (Appendix F). Landrum and Muench (1994) noted that library instruction should increase a student's knowledge of information resources and increase the use of those resources. A method for determining whether this in fact has occurred is to review bibliographies created by the participants per the discussion of studies utilizing this method of evaluation as noted in the literature review. The participants submitted a short bibliography on a topic related to their course as part of a required class assignment. The data requested included the topic, thesis statement, and bibliography.

The bibliography was scored for: number of citations, variety of information resources, currency of resources, use of consistent publication style, and scholarship of

resources in order to attain a score for the participants' course-related work prior to completing the online library instruction tutorial, TILT. The criteria utilized for the review and scoring of the bibliographies were derived from Gratch's (1985) discussion of this methodology and reflected the intended instruction of the TILT modules. The bibliography scoring rubric may be found in Appendix G.

Participants accessed the pre-bibliography Web page (Appendix H) from the library study Web site and entered the requested data by either a 'cut and paste' method using their original electronically-saved papers or by keying the data directly into the text boxes. A submit button at the bottom of the Web page sent the data as an email to the researcher.

The researcher scored the bibliographies based on the scoring criteria identified in Appendix G. The scores were entered into the data collection spreadsheets and identified with the participants' study code.

The students received an acknowledgement email directing them to the next activity, the online library instruction tutorial, TILT, (Appendix I).

Texas Information Literacy Tutorial

After participants submitted the first two activities, they were instructed by the researcher (Appendix I) to access and complete the Texas Information Literacy Tutorial (TILT). The instructions were available on the study Web site's TILT Web page as reproduced in Appendix J. The link for the tutorial itself was accessible on the TILT instruction Web page. Participants were directed to use the "First Time Visitor" link for registration at the TILT Web site. The participants then choose either the "Full" or "Lite" version depending on their individual hardware/software specifications. The instructional

content was not different for either version, only the amount of ‘bells and whistles’ during the presentation. No other specific instructions in terms of topic choices or order of module viewing were given. The study instructions included a note to email the researcher the three module quiz scores for data collection. The instructions requested participants to enter their study code as the first and last name on the TILT quiz Web page so that each quiz score was coded with the same study coding system as the previous data, assuring anonymity. TILT allowed the quiz score page for each module to be emailed to an address that the participant supplied, in this case the researcher’s email address. The scores were received and entered into the spreadsheets. Included in the instructions for the TILT activity were directions to access the links on the study Web site for the final two activities.

The participants’ completion of the online tutorial and submission of the quiz scores corresponds to Level 2: Interacting with the Library affective, cognitive, and psychomotor domains of the taxonomy. Motivation to complete the tutorial and send the quiz scores to the researcher demonstrated the student’s willingness to learn the library skills presented by the tutorial, to use the skills to access the resources discussed in the tutorial, and to navigate through and complete the tutorial including sending the scores to the researcher.

Post-Instruction Bibliography

After completing the online library instruction provided by TILT, the participants were requested to submit the post-instruction bibliography as part of the student’s required class assignment per the instructions noted in the TILT study instruction Web site. The post-bibliography Web page was reproduced in Appendix K. Participants used

the same methods of entering their data as they used for the pre-instruction questionnaire. The submitted data was received through email and was scored using the same criteria as the previous bibliography with results entered into the electronic spreadsheets.

Post-Instruction Questionnaire

Participants accessed the post-instruction questionnaire through the study Web site. This was the same instrument as the pre-instruction questionnaire but without the demographic questions, and was submitted for review, evaluation, and recording just as the other activity data. Again, the participants' study code was the identifier for entering the data into the spreadsheets. This was the final activity for the study and participants received an email noting their completion of all the library study activities (Appendix L).

By this point in the study, the students demonstrated Level 3: Internalizing the Library competencies in all three of the domains in the taxonomy. The post-instruction questionnaire responses reflected affective behaviors of the participants. The questionnaire and the post-instruction bibliography reflected cognitive competencies and the completion and submission of all the activities reflect psychomotor competencies. Determining statistical change in the pre- and post-instruction data validates the usability of the taxonomy with an electronic instructional environment by demonstrating significant changes in the level of library research strategies and library skill competencies demonstrated by the bibliographies.

CHAPTER 4

RESULTS AND DISCUSSION

Introduction of Study Data

The analysis of the data illustrates a student's ability to accomplish the competencies identified in the levels and domains of the library learning taxonomy through participation in an online library instruction tool. The study results should validate the taxonomy theory as adapted to incorporate library instruction delivered online. For the instructional tool to be considered effective, it must positively alter the information seeking behaviors of the students and positively influence the demonstrated use of library skills.

Sample Population

The sample population consisted of students who received information about the study from their instructors. The instructors of the identified courses received an email from the researcher describing the study and requesting their assistance in sharing the study intent and study Web site URL. Instructor intervention was necessary due to students' not having an institutionally provided email account. Central Texas College (CTC) does not provide email accounts for its student population. Thus, access to the students in specific courses required first contacting specific instructors and the students then providing their own email addresses with their study activities. Students who did not have an email address or access to one would not be participants. This is obviously a negative study participant limiter that other institutions may not encounter.

The email to instructors encouraged them to respond to the researcher with any

questions about the study or its intent. The responses received by the researcher included positive comments, especially concerning the use of the library resource tutorial; notice that a particular instructor did not require the type of research papers requested by the study, specifically papers with bibliographies; questions about the intent of the study, some instructors mistakenly thought the study was focusing on copyright issues; and then there were those who did not respond at all. This method of acquiring study participants possibly impacted the number of responses due to the dependence on instructor collaboration.

The population of students at Central Texas College, as noted previously, is not generalizable to most institutions of higher learning. The high number of active military and military-related students causes the student population to be in constant fluctuation. This fact was intensified by the current volatile situations faced by the military and the large numbers of troops being deployed during the study time period.

The movement of students and the fact that they must have their own email accounts may have affected the number of students who submitted the first or first few activities and did not complete the study. In an effort to determine causes for a lack of completion an end-of-study follow-up email (Appendix M) was sent to online participants who did not complete all of the study activities after the end course term for the online classes. Most of the emails sent to those participants were not responded to, a few created system-generated messages that noted the email address was no longer active, and one participant responded that her husband had been deployed and that with two small children and a move out of state, she simply could not complete her classes.

Taxonomy of Library Skills

As previously noted, students were made aware of the library study through their instructors. The students made the decision to access and review the library study Web site's introductory message. The library study's main Web site provided information to the students about the online library instruction tutorial and related activities. The students then made decisions to; receive library instruction and participate in the study (affective), pursue the instructions and respond to and submit the requested initial activity (cognitive), and access and navigate the study Web site, email, and instructional software (psychomotor). These are the Level 1: Orienting to the Library competencies of the taxonomy noted in Appendix B. Students who completed and submitted through email the pre-instruction questionnaire, thus agreeing to participate in the study, demonstrated the desire to participate and the ability to use the technology required and are represented in Table 1. The minimum of 50 identified as enrolled in traditional delivery courses and 50 in online courses was met. These students were considered to be fully engaged in Level 1 of the taxonomy.

Table 1

Initial Study Participants

	Submitted Pre-Instruction Questionnaire
Traditional Instructional Delivery	78
Online Instructional Delivery	60
Total Participants	138

Demonstrated accomplishment of the competencies identified in Level 2:

Interacting with the Library of the taxonomy consisted of the completion and submission of all three of the TILT module quizzes. The students' accessed, navigated, and interacted with the tutorial, and then completed and sent the quizzes to the researcher. Those who completed all activities up to and including the tutorials were interacting with online library instruction and resources through all three domains identified in the taxonomy.

Level 3: Internalizing the Library of the taxonomy expected the student to demonstrate the internalization of the skills learned through the online library tutorial. The study methods used to demonstrate the competencies of this level were the differences in the questionnaire scores and the differences in the bibliography scores comparing pre-instruction to post-instruction. The completion and submission of all the activities by the participants demonstrated their Level 3 competencies and the hypotheses determined the statistical significance of the scored data.

The researcher noted the number of students who completed the pre-instruction questionnaire, and a few of the other study activities, but that did not complete all activities. The percentage of those who completed all activities was 40%; 55.7% of traditional delivery participants completed all activities while only 20% of the online delivery participants completed all activities. An email to the online students that did not complete gave some reasons for this. Many of the online students were active military or military related. This created difficulties for students in course completion due to deployments and changing home-life conditions.

The participants who completed all the activities are noted in Table 2.

Table 2

Study Completers

Submitted All Activities	
Traditional Delivery	44
Online Delivery	12
Total	56

The fact that both students identified as being in a traditional delivery course and those identified as being in an online delivery course were able to achieve the competencies identified by the taxonomy demonstrates its ability to be an affective tool for library instruction. Per the literature review, the need for such a tool is as critical today with the high percentage of online course offerings and enrollments as it was previous to the online instructional environment.

Analysis of Data

Demographic Data

The demographic data for all participants who submitted the pre-instruction questionnaire revealed the following: the percentage of females was slightly higher than males; 53.6% to 46.4%. Participants who were less than 29 years of age accounted for 66.7% while 33.3% designated they were over 28 years old. English was the primary language for 91.3% and 69.6% were employed. Computers were used on the job by 59.4%. Those who identified themselves as active military accounted for 34.8%.

A high percentage of the participants, 97.1%, designated previous college level coursework. This number compared to but was not equal to the 92.8% who designated

this was not their first time enrollment in post high school courses. As reflected in the previous tables, more participants were enrolled in traditional delivery courses than were enrolled in online delivery.

For the three questions on library use; public library, college library, and online library; 53.6% to 57.2% noted they used these resources 'sometimes.' The 'frequently' response accounted for 18.8% to 27.5%, and 'never' responses accounted for 14.5% to 27.5% for all three resources. The response to having participated in traditional library instruction was evenly divided between 'yes' and 'no', 49.3% to 50.7%, while 88.4% responded 'no' to having participated in online library instruction.

Completer Demographics

A number of the students who submitted the first study activity did not complete either all or some of the remaining four activities of the study. Thus, a review of the demographics for those participants who completed all of the library study activities was conducted as only the data from these participants was included in the hypotheses statistical analyses.

More females, 62.5%, completed the library study activities than males, 37.5%. Responders identified as less than 29 years of age were 73.2% while 26.8% were older than 28 years of age. English was the primary language for 91.1% but only 55.4% were employed with 44.6% noting that computers were used on the job. Of the completers, 17.9% designated themselves as active military.

The percentage of previous college students, 98.2%, and the percentage of students who identified themselves as returning students, 92.9%, were not very different from the total demographic percentages. A higher number of traditional delivery

students completed the study than online delivery students.

For the items asking about the students' use of libraries; 53.6% of the completers noted 'sometimes' use of college libraries and online libraries with public library use at 60.7%. Responses of 19.6% to 26.8% noted 'frequently' using those resources and 19.6% to 23.2% noted 'never' using the libraries. Participation in traditional library instruction was designated by 44.6% and online instruction participation was designated by only 12.5%.

Statistical Process

All of the hypotheses testing were conducted using the data of those participants who completed all the activities of the study. Thus, there were a total of fifty-six participants whose data were included in the following analyses. As this is a descriptive study, the analyses were comparisons of means derived from the data collected.

The data collected in the spreadsheets was imported into a statistical program, SPSS. The means, other statistical data, and statistical tests were generated through that software.

Testing for statistical significance for each hypothesis of the four research questions was conducted by using appropriate statistical tests. The specific test used was dependent on the number of independent variable and which dependent variables were being compared. All the statistical testing was conducted at a 95% confidence level.

A summary of the statistical data used for the hypotheses testing related to the means are included in Appendix N, Appendix O, and Appendix P.

Research Question 1

The first two hypotheses about the level of library research strategies relate to Research Question 1 and were investigated through paired samples t test between the item scores of the pre- and post-instruction questionnaire and the criteria mean scores of the pre- and post-instruction bibliography scores.

For Hypothesis 1, the paired samples t test statistical comparison of the pre-instruction questionnaire item scores to the post-instruction questionnaire item scores was demonstrated as significant with a t score of 6.61 with 55 degrees of freedom. In addition, the gain in scores was directionally positive as evidenced by the pre-instruction questionnaire mean score of 36.57 as compared to the post-instruction mean score of 43.95. The highest attainable score on the questionnaire was 74.

Comparing the means of each item in the pre-instruction questionnaire to the same post-instruction item means provided the following results. Of the 31 items in the questionnaire, 26 had a positive increase as reflected in Appendix O.

For further review of the questionnaire, the researcher conducted paired samples t test on the item means for the four identified topics; person-specific, paper-specific, library-specific, and reference specific, to determine correlation in the topic areas between the pre-instruction questionnaire responses and the post instruction responses. The results for the four topics appeared to be highly correlated between the pre-instruction and post-instruction scores with a range of .93 to .99 with 1.00 signifying a perfect positive relationship. The participants did not demonstrate a decrease in their self reporting of library behaviors in any of the four topics after participating in the online library tutorial.

The same paired samples t test analysis was conducted on the criteria scores of the pre-instruction bibliographies as compared to the post-instruction bibliographies criteria scores to determine significance for Hypothesis 2. The t score of 2.98 with 55 degrees of freedom demonstrated a significant difference in the scores of the bibliographies at the 95% confidence level. Also, there was a positive increase in the criteria items mean score for the post-instruction bibliographies, 6.52, as compared to the pre-instruction mean score of 5.90. The highest score attainable was 9.

A comparison of each of the bibliography criteria score means revealed a positive increase in scores for most of the post-instruction criteria and particularly with the *scholarship of the resources* criteria. The *organization of the citation list* criteria demonstrated a loss in the mean score and there was no change at all in the criteria of *inclusion of all citation elements required for each item in the bibliography*. The data is reflected in Appendix P.

An average of the three TILT quiz scores for each participant was entered into SPSS to obtain a mean score for the participants who completed not only the three TILT module quizzes but all the library study's activities. The scores were reported by TILT as a percentage correct for each quiz. An overall mean of 90.89% was demonstrated for the study completers. The highest average possible was 100%.

Research Question 2

There are three hypotheses for Research Question 2 relating to possible differences occurring as a result of course delivery method the student was enrolled in; whether traditional face-to-face instruction or online delivery. For Hypothesis 3 a paired sample t test comparison of the pre-instruction questionnaire item scores and the post-

instruction item scores for each of the two groups was conducted.

Each of the two groups evidenced significant positive differences in their paired sample scores as evidenced with a t score of 5.01 with 43 degrees of freedom for the traditional delivery group and a t score of 6.04 with 11 degrees of freedom for the online delivery group at a confidence level of 95%.

It is interesting to note that the online course delivery participants began with a lower mean score, 34.58, on the pre-instruction questionnaire than the traditional delivery participants whose mean score was 37.11 and, after the online library instruction, demonstrated a higher mean score of 44.42 as compared to the traditional delivery post-instruction mean score of 43.82. In other words, it appeared from the mean scores that the online participants made the greater gain as evidenced by their responses to the Library Research Strategies Questionnaire items.

An ANCOVA was conducted to test for significant variance between the two groups while attempting to reduce pre-instruction questionnaire score bias. The test did not demonstrate any statistically significant variability between the two groups with an F score of 1.34 with 1 degree of freedom at the 95% confidence level. Thus the two groups behaved in a similar manner on the pre- and post-instruction questionnaire item scores; both groups demonstrating an increase in the post-instruction mean scores.

A paired sample correlation of means for the four identified topic areas for each of the two groups are represented in Table 3. The correlation between the pre-instruction questionnaire and the post-instruction questionnaire for each of the two groups is closely and positively related for each of the topic areas, thus both groups' library strategy behaviors in each topic area were increased.

Table 3

Correlation of the Library Research Strategies Questionnaire Topics

Topic	Traditional Delivery	Online Delivery
Person-Specific	.97	.93
Library-Specific	.99	.99
Paper-Specific	.92	.94
Reference-Specific	.98	.90

Number is 56.

The pre-instruction bibliographies and post-instruction bibliographies were analyzed between the traditional delivery and online delivery groups for Hypothesis 4 to determine if there was a significant difference in scores for either group. A paired sample t test review of the two groups demonstrated that only the traditional delivery pre- to post-instruction bibliography criteria scores evidenced a significant difference with a t score of 2.79 with 43 degrees of freedom while there was not a significant difference for the online delivery pre- to post-instruction criteria scores as demonstrated by a t score of 1.10 with 11 degrees of freedom.

The mean scores for the online delivery participants were lower than for the traditional delivery for both the pre-instruction bibliography criteria scores and the post-instruction criteria scores as demonstrated in the summary of statistical data, Appendix N, although both groups did increase their mean scores. The ANCOVA for demonstrating variance in behavior of the two groups and their bibliography criteria scores was not statistically significant as demonstrated by an F score of .01 with 1 degree of freedom. That both groups increased their post-instruction bibliography

scores is further supported by this test.

The TILT scores for each of the three quizzes were reported as a percentage correct. The participants' average scores for the three TILT instructional modules produced a mean score for traditional delivery participants of 91.77% while the online delivery participants mean score was 87.67%. Again, the highest average possible was 100%. An F score of 2.18 with 1 degree of freedom demonstrated a lack of variability between the two groups on their TILT scores. Both groups of participants performed well on the quizzes with the difference of course delivery method demonstrating no affect.

Research Question 3

Research Question 3 sought to determine if a statistically significant difference between participants that identified themselves as first time enrolled and those that were returning students. Of the fifty-six completers only four designated 'yes' for the demographic item asking if this was the students' first post-high school course. Three of these four students then answered a second demographic question asking if they had completed previous courses at the college level with a 'yes'. With only one of the 56 participants clearly designating himself as a first semester college student, there was not sufficient data for any statistical comparisons. Therefore, the three hypotheses relating to this research question cannot be responded to.

Research Question 4

Research Question 4 reviews the active military and civilian participant groups' score differences and the hypotheses are investigated by comparing the scores for the two groups using the same statistical tests as Research Questions 2. The number of

complete responses for Research Question 4 hypotheses is 54 due to two participants not responding to the demographic question identifying them as military or not.

Hypothesis 9 compares the pre-instruction questionnaire scores to the post-instruction scores for the groups identified as active military and civilian. A significant difference was demonstrated with a t score of 4.23 and 9 degrees of freedom. A significant difference was also noted for those identified as civilians with a t score of 5.12 and 43 degrees of freedom for the same comparison. Both groups positively increased their mean scores and the means are presented in the summary of data found in Appendix N.

The test for variability between the two groups was conducted and a lack of statistical significance was demonstrated with an F score of 1.469 with 1 degree of freedom. As with the traditional delivery and online comparison, the behaviors of the military and civilian participants were comparable as both groups increased their library skills questionnaire scores.

A review of the questionnaire scores by the four identified topics for these two groups as presented in Table 4 shows a high correlation between the paired responses of the questionnaire with correlation values ranging from .88 to .99 with 1.00 reflecting a perfect positive correlation.

Table 4

Correlation of the Library Research Strategies Questionnaire Topics

Topic	Activity Military	Civilian
Person-Specific	.91	.88
Library-Specific	.96	.99
Paper-Specific	.90	.92
Reference-Specific	.89	.97

Number is 54.

The comparison of the mean difference between the pre-instruction bibliography mean score and the post-instruction mean score demonstrated for each of the two groups identified was conducted for Hypothesis 10. A *t* score of 0.00 and 9 degrees of freedom for the group identified active military was not significant due to the mean score for the pre-instruction bibliography items being equal to the post-instruction mean score.

The same comparison was made for the group identified as civilians and a *t* score of 3.71 and 43 degrees of freedom demonstrated a significant difference between the pre-instruction bibliography mean score and the post-instruction mean score.

A statistical test to determine if the two groups behaved differently on this measure was demonstrated as not significant with an *F* score of 2.11 with 1 degree of freedom. The variance in the scores of the two groups was not great enough to cause a significant statistical result.

A review of criteria items for the identified active military group showed three criteria that did not increase after online library instruction. The three criteria included the *use of traditional information resources*, the *currency of the resources*, and the

organization of the citation list. The civilian group showed an increase in the mean scores of each of the criteria with the exception of only one, the *inclusion of all elements for the citations* criteria.

The mean TILT quiz scores for each of the groups identified in Hypothesis 11 were close with a mean of 90.00% for the active military group and a mean of 91.23% for the civilian group. An F score of .157 with 1 degree of freedom demonstrated a lack of variance between the two groups on their TILT scores.

Review of Previous Library Instruction

As discussed in Chapter 1, the researcher reviewed the demographic items specific to previous library instruction. A comparison of the score data for students who responded 'yes' to receiving library instruction prior to this study, whether or not the instruction occurred face-to-face or online, to those students who had not received prior library instruction would increase the breadth of knowledge about the library research skills of the study participants.

Thus, a review of the level of library research strategies for students who participated in the study's online library instruction in addition to having received library instruction prior to this study compared to students who had not received previous instruction was conducted. For all of the 56 completers, a comparison of the pre-instruction questionnaire mean to the post-instruction mean for those responding 'no' to previous library instruction demonstrated a significant difference with a t score of 5.80 with 30 degrees of freedom. A significant difference was also demonstrated for those responding 'yes' to previous library instruction with a t score of 3.49 with 24 degrees of freedom. The online instruction appeared to affect the students' measures whether or

not they identified previous library instruction.

A similar review was conducted to compare the mean scores for students' research paper bibliographies for having received library instruction prior to this study versus students who had not received previous instruction. A t test was conducted for the group identified as not receiving previous library instruction. The t score of 1.45 with 30 degrees of freedom was not statistically significant. The same test for the group identified as having received previous library instruction was statistically significant with a t score of 3.13 with 24 degrees of freedom.

The mean scores for the both the questionnaire and bibliography measures of both of these two groups were close. The amount and type of previous library instruction that the participants may have received did not appear to have a significant demonstrated effect.

CHAPTER 5

RECOMMENDATIONS FOR FUTURE RESEARCH

Research Question Results

The online library instruction tutorial was studied to determine its effect on the library skills of students. This effect was significant for demonstrating that the online tutorial would provide the library instruction students need to progress through the levels and domains of the *theory of library skills* and then exhibit measurable learning outcomes related to the instruction. The assessment of the measurable learning outcomes is critical in determining whether student's are learning and using the skills learned.

Online Library Tutorial Effect

The students who participated in the study demonstrated a statistically significant positive increase in the level of library research strategies and skills. This increase was demonstrated in both the scores of the Library Research Strategies Questionnaire and student produced bibliographies. This is very important for library instruction since it demonstrated that although the instruction was obtained electronically, it did in fact positively change the behaviors and information literacy skills of the students. That the online tutorial was able to be incorporated into the taxonomy of library skills provides higher education librarians with an important theoretical tool that influences both instruction and documentation of learning outcomes.

Comparing the online library learning effect on the information literacy behaviors of students identified as enrolled in a traditional delivery courses with those identified as

enrolled in an online delivery course demonstrated some differences between the groups although both groups exhibited a positive increase in scores on both measures. Specifically, the online delivery students demonstrated greater gain in the questionnaire scores although the gain in bibliography scores between the two groups was not as pronounced.

In addition though, it was interesting to discover the scores for the online delivery participants were significantly lower than those of the traditional delivery participants for both the bibliography submissions. The reasons for this were beyond the scope of this study, but may be attributed to the delivery method as differences in class assignment expectations and requirements. Differences in course disciplines could also have influenced this comparison. Given that the students were completing the study activities there should not have been an access to library resources limitation.

The average scores for each of the two groups resulting from their online library instruction tutorial, TILT, were not very different. The students, regardless of the delivery of their course instruction, were able to perform well on the tutorial quizzes. Thus, it would appear from these hypotheses that the use of the tutorial did provide instruction for students within the framework of the taxonomy and any influence from course delivery methods was minimal.

The comparison of the group identified as active military to those identified as civilians was similar to the results of the delivery method comparison. The scores for the questionnaires did increase after the online library instruction for both groups and was statistically significant. Again, this supports the use of the online library instruction as a tool that can affect student library behaviors.

The one comparison that was a singularly unusual result was the bibliography scores demonstrating no difference between the pre-instruction bibliography and the post-instruction bibliography for those identified as active military. The means were equal. As noted previously, the military student has many external influences affecting their ability to access and complete not only classes but also class assignments and information resources and this may have affected this particular measurement. This demographic group is difficult to target for prolonged studies do their planned and unplanned military-related movement.

A review of participants who noted on the demographic items they had received previous library instruction to those who noted they had not does not find significant differences in any of the statistical comparisons. Thus, previous library instruction appeared to not affect the library study and the increases in the scores on the pre-instruction and post-instruction scores for the two measurements can be attributed to the online library instruction.

The lack of participants who identified themselves as first-semester students was a significant factor for the study. This may be attributed to the fact that Central Texas College does not have any type of freshman-specific orientations, first-year experience activities, or other methods for identifying and grouping this demographic. With a student population that does not generally enter as a freshman cohort and that may begin their higher education studies as a distance education student, this is a population that should be strongly considered in future studies. The online library instruction tutorial, based on the results noted in this study, would affect these student's ongoing education and life-long learning skills.

Measurement Tools

The necessity of documenting learning outcomes was discussed previously. The measurements selected for use in this study allowed for such documentation. This is critical for educational institutions as we are in an environment of accountability as evidenced by the discussion of the standards for the regional academic accreditation commissions and for the libraries of these institutions to demonstrate that information literacy learning is necessary and beneficial for all students.

The use of multiple measurement tools strengthened the internal validity and reliability of the study by demonstrating a positive statistical significance in the study results. The necessity of multiple measurement methods is noted in the literature review by a number of authors (Bober, Poulin, & Vilen, 1995; Roselle, 1997; Webster & Rielly, 2003). The lack of a significant variability between the study groups is considered another internal validity component as social environment and access to physical resources could affect a student's progress through the study activities. All groups were able to achieve the competencies of the taxonomy and exhibit positive results on the measurement tools.

The measurement tools used in this study did not attempt to review the presentation style or Web design methodology of the online tutorial, only the learning derived from participating in the tutorial. This is an important distinction due to the multitude of publications discussing assessment of learning when in fact the tool itself is being assessed. Such publications were discussed in the literature review. The use of the theoretical taxonomy would focus assessment discussions on demonstrated and

measurable learning outcomes and when coupled with the ALA standards would highlight students' attainment of skills required for information literacy competencies.

Implications for Future Research

This study was intended to demonstrate the affect of using an online instructional tool for information literacy learning. The integration of the tool into a previously studied *theory for library learning* allowed the researcher to determine if the instructional tool did have such an affect. The positive results of the study provide encouragement to librarians and educational institutions promoting information literacy for life-long learning.

Further research could focus on the first semester student to ensure that the information literacy skills learning critical to their educational success happens and is measured and documented. While it is unknown why this demographic was underrepresented in this study, institutions with identified freshman or first-semester cohorts could replicate the study for this group.

Another area of study would involve investigating the differences in class assignments due to course delivery. It was assumed for this study that a student-produced bibliography would not vary much due to course discipline or assignment. As a result of the difference in pre-instruction and post-instruction bibliography scores for the online students as compared to the traditional delivery course students, there may be variations in the expectations of instructors and students and this variation may be reflected in course assignments for online delivery students.

Research to further identify assessment tools required to document learning outcomes is needed especially for those assessments that reflect the student's use of

the skills learned. The literature review identified a few such as a full review of research papers, a review of a portfolio of student created products that reflect information literacy competencies, and implementation and review of student product created specifically for library skills competency review.

Each of these measurement tools could be utilized throughout a student's academic experience and provide a much needed longitudinal review focusing of the highest level of the taxonomy of library learning, the internalization of library skills learning. Determining if the skills learned are improved upon, are used across disciplines, and are evident at a level demonstrating internalization would add depth to information science as a discipline and would provide a strong foundation for librarians in their promotion of information literacy instruction.

The distance education trend increases the development and use of various instructional delivery technologies and allows more students to have access to educational opportunities and information resources. Supporting these efforts through emphasizing information literacy competencies is critical for higher education and for the librarians who are tasked with this effort.

APPENDIX A
TAXONOMY OF LIBRARY SKILLS AND ERRORS

(Reproduced with permission from American Library Association.)

	Affective Domain	Cognitive Domain	Psychomotor Domain
Level 3	Affective Internalization	Cognitive Internalization	Psychomotor Internalization
Internalizing the Library	Demonstrating support for the library perspective on society and self. (= library conscience and morality versus negligence)	Acquiring personal knowledge and subjective intuition of a scholarly discipline. (= disciplinary connection versus lacking connection)	Performing cumulative searches in one's field and promoting the library in one's life. (= lifelong library use versus library disuse)
Level 2	Affective Interaction	Cognitive Interaction	Psychomotor Interaction
Interacting with the library	Demonstrating continuous striving and value preferences favorable to the library and its system. (= positive library attitude versus library resistance)	Acquiring objective knowledge of search sequences, their analysis and syntheses. (= library search and protocol versus idiosyncratic search protocol)	Negotiating search queries and performing a single, one-time search that meets a current information need. (= library proficiency versus library ineptitude)
Level 1	Affective Orientation	Cognitive Orientation	Psychomotor Orientation

Orienting to the Library	Demonstrating willingness to practice library tasks and maintaining selective attention. (= library adjustment versus library maladjustment)	Acquiring representative knowledge and comprehending library-relevant distinctions. (= library map and glossary versus library ignorance)	Performing physical operations (hands-on experience, browsing and walking around). (= library exploration and efficiency versus library avoidance and inefficiency)
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Note: From "Learning the Library: Taxonomy of Skills and Errors," by L. A. Jakobovits and D. Nahl-Jakobovits, 1987, *College and Research Libraries*, 48(3), p. 207. Copyright 1987 by the American Library Association. Reprinted with permission.

APPENDIX B
UPDATED TAXONOMY OF LIBRARY SKILLS

(Adapted with permission from American Library Association.)

	Affective Domain	Cognitive Domain	Psychomotor Domain
Level 3	Affective Internalization	Cognitive Internalization	Psychomotor Internalization
Internalizing the Library (integrating the information literacy skills)	Communicating via email, chat room, or online classroom with the library to express needs, satisfaction, questions, success, etc.	Utilizing the knowledge gained to complete course related assignments following accepted standards.	Develop a 'book mark' collection or bibliography of resources of both databases and internet sites to support learning.
Level 2	Affective Interaction	Cognitive Interaction	Psychomotor Interaction
Interacting with the Library (increasing information literacy skills)	Recognizing the need to access all the online instructional modules and utilize various information resources.	Completing the tutorial, determining the appropriate information resources for coursework, and applying information evaluation skills.	Ability to utilize various search screens, search strategies, and information resource formats.
Level 1	Affective Orientation	Cognitive Orientation	Psychomotor Orientation
Orienting to the	Demonstrating intrinsic motivation to	User locates and learns adequate	Physical actions requiring sitting,

Library	learn how to access	technological skills	keyboarding skills,
(need	for	and evaluate	and clicking on
information	information.	to utilize the online	navigational icons
literacy		tutorial.	within an online
skills)			tutorial.

Note: From “Learning the Library: Taxonomy of Skills and Errors,” by L. A. Jakobovits and D. Nahl-Jakobovits, 1987, *College and Research Libraries*, 48(3), p. 207. Copyright 1987 by American Library Association. Adapted with permission.

APPENDIX C

DEMOGRAPHICS DATA QUESTIONS AND SCORING

The coding numbers did not appear on the student version of the questionnaire.

1. Gender

- a. male (0)
- b. female (1)

2. Age

- a. 17-21 (0)
- b. 22-28 (1)
- c. 29-40 (2)
- d. over 41 (3)

3. This is my first semester enrolled in a post high school course.

- a. yes (0)
- b. no (1)

4. English is my primary language.

- a. yes (0)
- b. no (1)

5. My course is taught in a tradition classroom setting.

- a. yes (0)
- b. no (1)

6. I have completed previous courses at the college level.

- a. yes (0)
- b. no (1)

7. I have received library skills instruction at a library.

- a. yes (0)
- b. no (1)

8. I use the resources at the public library

- a. frequently (0)
- b. sometimes (1)
- c. never (2)

9. My course is delivered online.

- a. yes (0)
- b. no (1)

10. I use the resources at the college library

- a. frequently (0)
- b. sometimes (1)
- c. never (2)

11. I have participated in online library skills instruction online.

- a. yes (0)
- b. no (1)

12. I am currently employed.

- a. yes (0)
- b. no (1)

13. I use the online resources provided by the library.

- a. frequently (0)
- b. sometimes (1)
- c. never (2)

14. My job requires my knowledge of computer skills.

- a. true (0)
- b. false (1)

15. I am enrolled as an active military student.

- a. yes (0)
- b. no (1)

APPENDIX D

STUDY WEB SITE MAIN PAGE

WELCOME TO LIBRARY LEARNING STUDY

This research study is conducted by Dana L. Watson for students at
Central Texas College

Hello:

Thank you for taking the time to consider participating in this research study. I am a doctoral student at the University of North Texas, and this study is part of my dissertation.

This will take a small amount of your time and will benefit you with your college-level research and term papers. The purpose of this research study is to look at how well an online library instruction tutorial will help college students with research paper information needs. Your responses will help us learn about students' use of information learned through an online tutorial. If you choose to participate expect to spend no more than a total of three hours and:

- Your participation is voluntary and you may skip any questions you choose not to answer.**
- Your name will not be used or associated with any data you provide, so your responses will be anonymous.**
- Only the researcher will have access to your data and results will be reported on a group basis, not individually.**
- Your participation will in no way negatively affect your course grade.**
- You may leave the study at any time by simply not returning to this web site.**

What will you be doing?

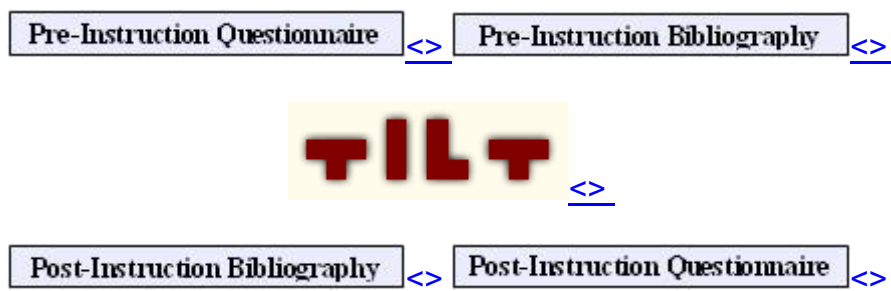
- Complete a short questionnaire about your current information research skills and some general questions about you.
- Submit the bibliography of your most recent research paper for this course.
- Take the online tutorial, including the quizzes at the end of each module. The online tutorial is interactive and can be adapted to a topic of interest to you.
- Submit the bibliography of the research paper you completed for this course after taking the online tutorial.
- Complete a short questionnaire about your information research skills after taking the online tutorial.

Thank you for your interest and time. I hope that your participation will benefit you on your future research/term paper adventures. If you have questions about this study you may contact me, Dana L. Watson, PhD Information Science Candidate, University of North Texas by clicking the email link at the bottom of this page or at 254/526-1154, or Dr. Linda Schamber, Associate Professor, School of Library and Information Sciences, University of North Texas at 940/565-3567. This research project has been reviewed and approved by the University of North Texas Institutional Review Board who may be contacted at 940/565-3940 if you have questions regarding your rights as a research subject. Central Texas College has reviewed and approved the research project. You may print this page for your records if you choose to participate.

Dana L. Watson

PhD Information Science Candidate, University of North Texas

To get started please click the [Pre-Instruction Questionnaire](#) button below.



Library Learning Study | [Home](#) | Last Updated: 16 June 2006 | [Email](#)

APPENDIX E

INSTRUCTOR INTRODUCTORY EMAIL

For instructors of selected undergraduate core courses for the purpose of recruiting study participants

(Instructor Name):

I am conducting a study to collect data on the information literacy skills and levels of students previous to and after their participation in an online library instruction tutorial. This study will encourage students to participate in an online library skills tutorial. It is hoped that the tutorial will benefit the students and that benefit will be reflected in their coursework. The study has been reviewed and approved by the Institutional Review Board of the University of North Texas and Central Texas College.

What can you do to help? First, let me say your assistance is critical for this study to be successful. Let your students know through an in-class announcement or by email that the study is available and their participation is requested. All they need is the URL for the study site and a little encouragement to visit the site. The study is conducted entirely online. You are welcome to review the site to see what the study is asking of the student participants. All student-provided information and data gathered for the study will be kept anonymous.

The courses being targeted for the study are summer schedule core courses taught both face-to-face and online and include ENGL 1301, ENGL 1302, SPCH 1315, GOVT 2301, GOVT 2302, HIST 1301, and HIST 1302. The courses selected should, during the length of the course, expect students to submit two papers that have bibliographies. The only parts of the papers that I am requesting from the students are

the title, introductory paragraph (thesis statement), and the bibliography.

Your assistance is greatly appreciated. The timeline for initial student response is within the first two weeks of the course. If you have any questions or are interested in the study or its results, please let me know. I will be happy to share information on the results.

The study site URL to be shared with the students is:

http://www.ctcd.edu/dlw_study_June06/index.html

Again, thanks for your support. My contact information is:

Dana L. Watson

PhD Information Science Candidate, University of North Texas

254/526-1154

dana.watson@ctcd.edu

APPENDIX F
ACKNOWLEDGMENT OF PARTICIPATION

Email sent by researcher to participants after receipt of Pre-Instruction Questionnaire

Thank you for answering the study questionnaire and agreeing to participate in this research study.

This email acknowledges that your study code is _____. For all communication with me, please use the study code either as the subject line of your emails or in the study code text box of each study submission.

For the course that you are currently in, you have recently completed a course paper with a work cited page or you may use a course paper that you have completed for a course in English, History, government, or speech that has a work cited page. On the study web page, click on the Pre-Instruction Bibliography button and by 'cutting and pasting' or typing in the text box, enter your paper's title, topic statement or first paragraph, and the full work cited page.

After this you are ready to click on the TILT button for the library skills tutorial.

If you have questions, please contact me.

Dana L. Watson

dana.watson@ctcd.edu

APPENDIX G
BIBLIOGRAPHY CRITERIA AND SCORING

Number of Citations:

1. Fewer than 3 citations in list. (0)
2. 3 and up to 5 citations. (1)
3. 6 or more citations in list. (2)

Variety of Resources:

1. Traditional sources include books, encyclopedias, and periodicals. yes (1); no (0)
2. Electronic sources include websites, databases, and ejournals. yes (1); no (0)

Currency of Resources:

1. Resources are considered timely for the topic selected, generally within 5 years.
yes (1); no (0)

Use of Consistent Publication Style:

1. The majority of the citations are recorded in a consistent format such that all necessary elements; i.e. author, title, date, as applicable to the source, are recorded in the same order. yes (1); no (0)
2. The majority of the citations are recorded consistently with respect to the appropriate and consistent use of punctuation. yes (1); no (0)
3. The list is in an organized manner such that the items are alphabetical in order.
yes (1); no (0)

Scholarship of Resources:

1. The citations include sources that are considered scholarly such as peer-reviewed journals, authoritative websites, such as .edu sites or online database designations. yes (1); no (0)

APPENDIX H
PRE-INSTRUCTION BIBLIOGRAPHY WEB PAGE

PRE-INSTRUCTION BIBLIOGRAPHY

Study Code: (first name initial, last name initial, last four digits of social security number)

Course currently enrolled that introduced you to this study (ex: ENGL1301):

eMail Address:

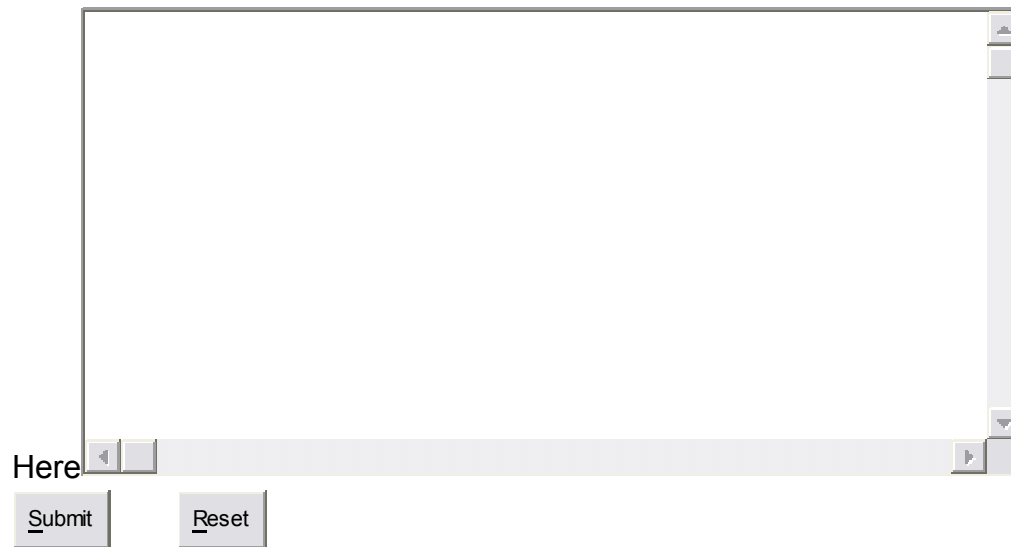
Select method of instruction you are registered for:

Online Face-to-Face

Enter Title and Thesis Statement or Paper's Topic Paragraph

Here

Enter Work Cited



Thank you! Please return to the [study page](#) and click on the **TILT** button found on the lower portion of the page. This is an online library skills tutorial.

APPENDIX I

PARTICIPANT CONFIRMATION RESPONSE EMAIL

To participants after pre-instruction bibliography was received

Participant (study code),

For the course that you are currently in, you have recently completed a course paper with a work cited page or you may use a course paper that you have completed I have received your bibliography. The next activity is the TILT online, interactive tutorial. As you complete the TILT (library skills tutorial), **remember to email the quiz scores to me**, dana.watson@ctcd.edu. The link for TILT is found on the Library Study web site, www.ctcd.edu/dlw_study_June06/index.html.

Your participation is very much appreciated! I hope you find TILT interesting and informative.

Dana L. Watson

APPENDIX J

STUDY INSTRUCTIONAL TILT WEB PAGE

INSTRUCTIONS FOR TILT

- From the initial screen click "Full TILT".
- Scroll down and click Enter TILT.
- Click "First Time Visitors".
- Enter your **STUDY CODE** as the First Name and the Last Name.
- Then complete the tutorial. You do not have to complete all three modules at one time.
- After answering a module quiz, fill in this email address to send the scores to the researcher: dana.watson@ctcd.edu

Click TILT button below to begin.



Now you are ready to use your new skills for your next research paper. When you have completed that paper, click on the Post-Instruction Bibliography button from the study web site.

APPENDIX K
POST-INSTRUCTION BIBLIOGRAPHY WEB PAGE

POST-INSTRUCTION BIBLIOGRAPHY

Study Code: (first name initial, last name initial, last four digits of social security number)

Course currently enrolled that introduced you to this study (ex: ENGL1301):

eMail Address:

Select method of instruction you are registered for:

 Online Face-to-Face

Enter	Title	and	Thesis	Statement
-------	-------	-----	--------	-----------

Here

Enter Work Cited Here

Submit

Reset

Thank you! Please [return to the study web page](#) and complete the Post-Instruction
Questionnaire.

Post-Instruction Bibliography | [Home](#) | Last Updated: 16 Jun 2006 | [Email](#)

APPENDIX L
COMPLETION RESPONSE EMAIL

Sent to study participants noting completion of all library study activities:

Library Study Participant (**study code**):

You have completed all of the Library Study activities. I hope that the experience was of benefit as you continue your information seeking for research papers and other needs. Your participation will influence the study results and is very much appreciated!!

Thank you again for your time and efforts,

Dana L. Watson

dana.watson@ctcd.edu

APPENDIX M
FOLLOW-UP EMAIL

Sent to online study participants who did not complete the library study activities:

Hello Library Study Participant (study code),

Now that your term has ended, here is one last follow-up question for the Library Learning Study (www.ctcd.edu/dlw_study_June06/index.html):

You began participating in the study's activities but at some point stopped. I understand that this may have been due to many reasons such as dropping the class, illness in family, military activities, study design or instructions, etc. Would you please say why you stopped participating?

As in the study itself, there are no wrong or right answers and the responses are kept anonymous. Your answer will provide valuable information for this and future studies.

Thanks in advance for your time and I look forward to your reply!

Dana L. Watson

Ph.D. Information Science Candidate, University of North Texas

APPENDIX N
SUMMARY OF STUDY DATA

	Pre-Instruction Mean	Post-Instruction Mean	Gain Mean	Number
Research Question 1				
Hypothesis 1 (Questionnaire)	36.57	43.95	7.38	56
Hypothesis 2 (Bibliography)	5.89	6.52	0.63	56
Research Question 2				
Hypothesis 3 (Questionnaire)				
Traditional Delivery	37.11	43.82	6.71	44
Online Delivery	34.58	44.42	9.83	12
Hypothesis 4 (Bibliography)				
Traditional Delivery	6.48	7.11	0.64	44
Online Delivery	3.75	4.33	0.58	12
Hypothesis 5 (TILT)				
Traditional Delivery	91.77%			44
Online Delivery	87.67%			12
Research Question 3*				
Research Question 4				
Hypothesis 9 (Questionnaire)				
Active Military	34.60	44.60	9.80	10
Civilian	37.27	43.64	6.36	44
Hypothesis 10 (Bibliography)				
Active Military	3.90	3.90	0.00	10
Civilian	6.32	7.11	0.80	44
Hypothesis 11 (TILT)				
Active Military	90.00%			10
Civilian	91.23%			44

Note: Highest possible Questionnaire score was 74. Highest possible bibliography score was 9.

*Research Question 3 lacked identified first-semester students.

APPENDIX O

LIBRARY RESEARCH STRATEGY ITEMS MEAN SCORES

	Pre-Instruction Mean	Post-Instruction Mean	Difference
<hr/>			
Person-Specific			
Item 5 (0-1)	1.75	2.04	+.29
Item 11 (0-4)	2.50	3.14	+.64
Item 13 (0-4)	0.57	1.02	+.45
Item 17 (0-1)	0.79	0.64	-.15
Item 21 (0-4)	2.18	2.68	+.50
Item 22 (0-3)	1.55	2.13	+.58
Item 26 (0-3)	1.96	2.14	+.18
Item 28 (0-3)	1.64	1.80	+.16
Item 30 (0-1)	0.68	0.84	+.16
Item 31 (0-3)	1.58	1.91	+.33
Library-Specific			
Item 2 (0-1)	0.88	1.00	+.12
Item 3 (0-3)	2.23	2.29	+.06
Item 7 (0-1)	0.73	0.86	+.13
Item 12 (0-4)	2.25	2.64	+.39
Item 14 (0-2)	0.75	0.89	+.14
Item 16 (0-2)	0.41	0.61	+.20
Item 18 (0-4)	2.43	2.63	+.20
Item 19 (0-2)	0.57	0.86	+.29
Item 20 (0-1)	0.58	0.91	+.33
Paper-Specific			
Item 1 (0-1)	0.44	0.45	+.01
Item 4 (0-4)	2.18	2.30	+.12
Item 6 (0-1)	0.25	0.75	+.50
Item 9 (0-4)	1.13	1.73	+.60
Item 24 (0-1)	0.64	0.63	-.01
Item 25 (0-1)	0.09	0.20	+.11
Item 27 (0-3)	0.98	1.21	+.23
Item 29 (0-3)	1.74	1.70	-.04
Reference-Specific			
Item 8 (0-1)	0.18	0.31	+.13
Item 10 (0-1)	0.73	0.68	-.05
Item 15 (0-4)	1.68	2.13	+.45
Item 23 (0-1)	0.98	0.89	-.09
<hr/>			

Number is 56

Note: Score range given for each item.

APPENDIX P

BIBLIOGRAPHY CRITERIA MEAN SCORE

	Pre-Instruction Mean	Post-Instruction Mean	Difference
Number of Citations			
Criteria 1 (0-3)	1.55	1.70	+.15
Variety of Resources			
Criteria 2 (0-1)	0.86	0.93	+.07
Criteria 3 (0-1)	0.52	0.61	+.09
Currency of Resources			
Criteria 4 (0-1)	0.86	0.89	+.03
Use of Consistent Publication Style			
Criteria 5 (0-1)	0.39	0.30	.00
Criteria 6 (0-1)	0.39	0.50	+.11
Criteria 7 (0-1)	0.61	0.57	-.04
Scholarship of Resources			
Criteria 8 (0-1)	0.71	0.93	+.21
Number is 56			
Note: Score range is given.			

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